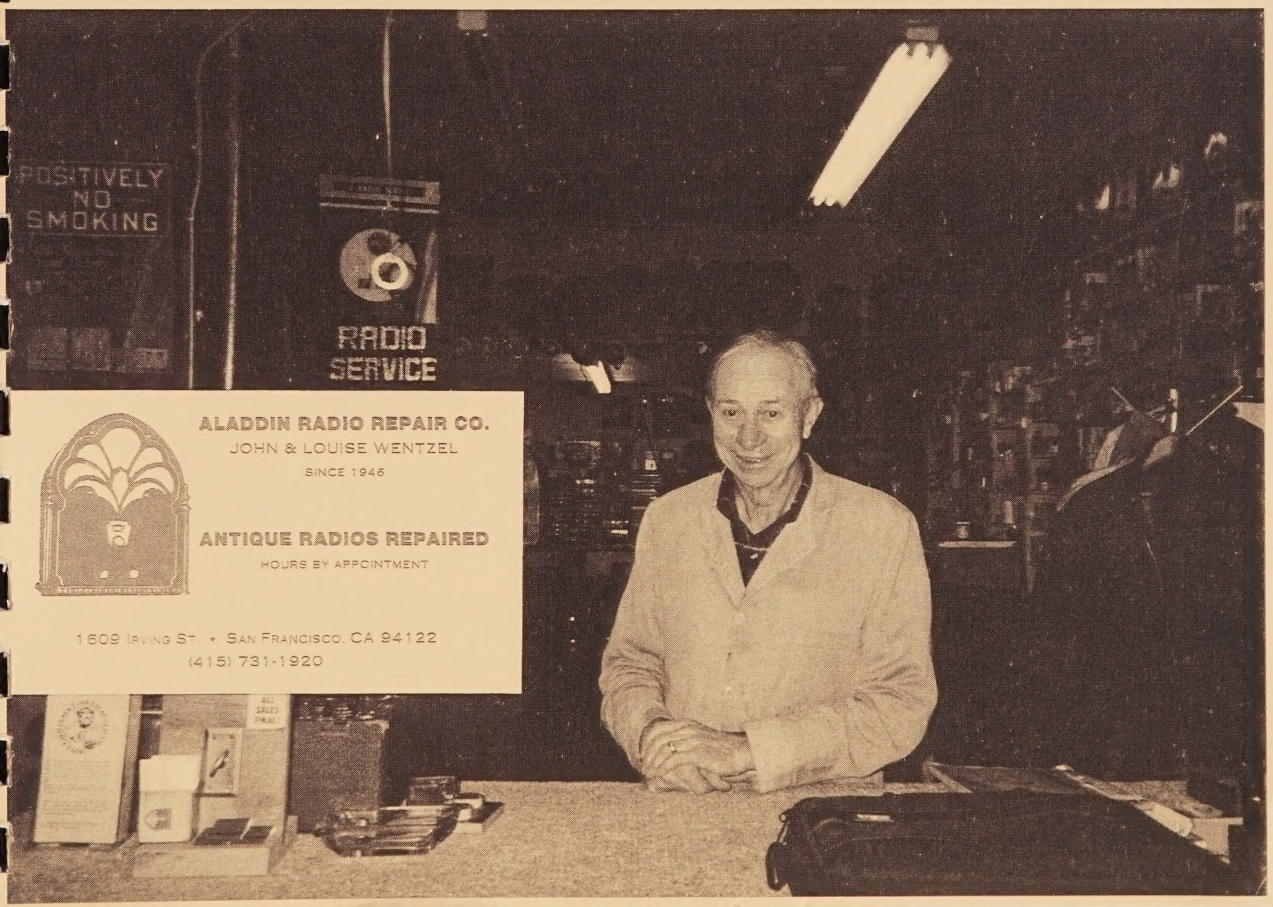
TWENTIETH ANIVERSARY ARCHIVE ISSUE!

1994- '95
VOL. 18, NO. 2
JOURNAL OF THE

CALIFORNIA HISTORICAL RADIO SOCIETY

FOR THE RESTORATION AND PRESERVATION OF EARLY RADIO

JOHN WENTZEL, WINNER, 1994 "DOC" HERROLD AWARD



Jan. 1995

1995 Election results:

President	- Dale Sanford	Directors	- Mike Adams
Vice Pres.	- Bart Lee		- Paul Bourbin
Treasurer	- Will Jensby		- John Eckland
Secretary	- Russ Turner		- Bart Lee
* Membership	- Hal Layer		- Mike Simpson
* Journal Editor	- Bart Lee		- Russ Turner
* Appointed			- John Wentzel

The prestigious Herrold Award will be presented to John Wentzel for his active contribution to the preservation of radio.

The officers and the board of directors thank you for your vote of confidence.

Membership:

Thank you to those that have renewed your membership in CHRS and welcome to the many new members. Our society is growing every year. All paid members will find their 1995 membership card enclosed. If you paid for an extended membership don't worry you will receive a new card each year. If you have not yet renewed - now is the time. Send your $15 check to PO box 31659 San Francisco CA 94131.

Sellers:

Remember that only CHRS members can sell at our collector events. You may join at the next Ampex meet.

Collector Interests:

Thanks for checking off your favorite interests on the membership renewal form. I goofed when I recopied the form by omitting several important subjects such as 1920's battery sets (My favorite), Ham gear, Wind up phonos, Horn Speakers and a few others. Many of you responded by marking other and we have noted your other interests.

Collector Events:

Feb. 4 1995 (rain or shine) 8:00 AM

Ampex parking lot if the sun shines or the Ampex cafeteria if it rains. If the weather is doubtful please bring blankets or cardboard to cover the inside tables. Directions to Ampex for new members on reverse.

March 4 1995 8:00 AM

This event will be held on the parking lot of Home Video in Benecia. Past president Jim McDowell has again offered his facility for this popular regional event. See map on reverse for directions

April Event in the planning stage, I promise to let all members know in advance. Journal and tape to follow.

For the Restoration and Preservation of Early Radio and Radio Broadcasting

Dale Sanford

P.S. WE NEED ARTICLES FOR THE JOURNAL - CONTACT ME (415) 435-6131

ENTIRE CONTENTS
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CALIFORNIA

HISTORICAL

RADIO

SOCIETY

ARCHIVE

Articles of Incorporation, December 6, 1974

By-Laws of the Society, 1975 as amended in 1988

Bulletins ## 1,2, March 15, 1975 & June 15, 1975

Journal, Covers and Collector Spotlight, Vol. 1, ##1,2, 1975

20 YEARS (AND MORE!) OF HINTS AND KINKS
AND TECH TIPS FROM THE CHRS JOURNAL!

"I belong to the radio of the month club."

731882

FILED
In the office of the Secretary of State
of the State of California
FEB 28 1975
MARCH FONG EU, Secretary of State
By Diane Beasley
Deputy

ARTICLES OF INCORPORATION OF
CALIFORNIA HISTORICAL RADIO SOCIETY
A NON-PROFIT CORPORATION

FIRST: The name of the corporation is California Historical Radio Society.

SECOND: The purposes of this corporation are:

(a) The specific and primary purpose is to educate and promote the history of radio and radio broadcasting to the public on an exclusive non-profit and charitable basis.

(b) The general purposes and powers are:

(i) To receive and expend property and funds in support of the specific and primary purpose.

(ii) No bequest, devise, gift or transfer of property or funds to the corporation for a charitable or educational purpose shall be invalid because of uncertainty as to the purposes or the beneficiaries thereof, but, to the extent to which such indefiniteness or uncertainty exists, it shall be resolved by the corporation in the manner which in its judgment is most consonant with the purposes of the donor and most conducive to the public welfare.

(iii) Subject to sections 40 through 43 of the California Probate Code, to take property and funds by any manner, with or without any specification of charitable or educational purpose, but they shall be held in use for only charitable or educational purposes.

(iv) To hold, in its own name and right, real and personal property of every nature and every description without limitation as to the extent, character or amount, and with all the powers

of control, management, investment, change, and disposal incident to the absolute ownership of property or funds by a private person, subject only to the terms of particular trusts and to the general trust that all its properties and funds shall be held for charitable, educational and eleemosynary purposes .

(v) To borrow money, either on or without security, and to issue promissory notes or other evidences of indebtedness and pledges, mortgages, or other instruments of hypothecation.

(vi) To appoint and pay officers and agents to conduct and administer the affairs of the corporation, but no member of the Board of Directors shall receive any compensation for the position held.

(vii) To adopt Bylaws prescribing the duties of the officers and agents of the corporation, the detail of its organization, the time and manner of its meetings, and any and all detail incident to its organization and the efficient conduct and management of its affairs.

(viii) To do any and all things which a natural person may do necessary or desirable for the general purpose for which the corporation is organized.

(ix) To sue and be sued.

(x) To qualify to carry on its nonprofit activities in any other state, territory, dependency, or foreign country, and to conduct its nonprofit activities within or without the State of California.

The foregoing statement of purposes shall be construed as a statement of both purposes and powers, and the

purposes and powers stated in each clause shall, except where otherwise expressed, be in no way limited or restricted by any reference to or inference from the terms or provisions of any other clause, but shall be regarded as independent purposes and powers.

(c) Notwithstanding any of the above statements or purposes and powers, this corporation shall not, except to an insubstantial degree, engage in any activities or exercise any powers that are not in furtherance of the primary purposes of this corporation.

THIRD: This corporation is organized solely for general charitable, educational and eleemosynary purposes under Part I of Division 2 of Title 1 of the California Corporations Code.

FOURTH: The principal office for the transaction of the business of this corporation is located in Santa Clara County, California.

FIFTH:

(a) The number of Directors of this corporation is Seven, and except for the First Directors the term of each director shall be three years.

(b) The names and residences of the members of the First Board of Directors are:

Names	Addresses
ONE YEAR TERMS with first term ending the second Tuesday in March, 1976	
Norman Ray Berge	2151 Oakland Rd. #198, San Jose California, 95131

Eugene Rippen	16619 Marchmont Dr., Los Gatos, California, 95030
TWO YEAR TERMS with first term ending the second Tuesday in March, 1977	
James Charles Cirner	13366 Pastel Ln., Mountain View, California, 94040
Peter Colin Brickey	20 Skyline Dr., Woodside, California, 94062
THREE YEAR TERMS with first term ending the second Tuesday in March, 1978	
Robert Gordon Middleton	P.O. Box 1061, Santa Cruz, California, 95061
Dave Brodie	315 Cotton St., Menlo Park, California
Kenneth Miller	1950 Cooley #6204, Palo Alto, California, 94303

(c) The First Directors named in these Articles of Incorporation shall hold office for terms of one year, two years, and three years respectively, and until the regular yearly membership meeting to be usually the second Tuesday of March as indicated in (b) above.

(d) Directors who resign or cease to remain in office as Directors for their entire term shall be replaced by persons selected by a majority of the Directors holding office at the time the vacancy occurs, and then only for a period to complete the term vacated.

(e) Except as otherwise provided by law, the powers of the corporation are vested in the Board of Directors which may delegate the performance of duties and exercise of powers to officers and agents of the corporation from time to time as it shall by resolution determine.

SIXTH: The Board of Directors shall constitute the corporation which shall have no voting members apart from such Directors, and membership as a voting member shall terminate on termination of the term of office of each Director. Directors may serve more than one term and may serve succeeding terms.

SEVENTH: The property of this corporation is irrevocably dedicated solely to charitable purposes.

EIGHTH: This corporation is organized and operated exclusively for charitable purposes, is not conducted for profit, and no part of its net earnings shall inure to the benefit of any Director, officer, or member thereof. On the winding up and dissolution of the corporation, after paying or adequately providing for, the debts and obligations of the corporation, the remaining assets shall be distributed to a nonprofit fund, foundation, or corporation which is organized and operated exclusively for charitable purposes and which has established its tax exempt status under Section 501 (c) (3) of the Internal Revenue Code. All assets held on trust by this corporation at such time shall be disposed of in such manner as may be directed by decree of the Superior Court of the county in which the Corporation's principal office is located, on petition therefor by the Attorney General or by any person concerned in the liquidation, in a proceeding to which the Attorney General is a party.

NINTH: None of the activities of this corporation shall consist of the carrying on of propaganda, or otherwise attempting, to influence legislation, nor shall this corporation participate, or intervene (including the publishing or distributing of state-

ments), in any political campaign on behalf of any candidate for public office.

TENTH: These Articles of Incorporation shall not be amended except by the vote or written consent of a majority of the Directors of this corporation.

ELEVENTH: The total number of Directors may be changed by amendment of the Bylaws adopted by vote or written consent of the members entitled to exercise a majority, or by vote of a majority of members at a meeting duly called pursuant to the Bylaws.

IN WITNESS WHEREOF, for the purpose of forming this corporation under the laws of the State of California, we, the undersigned, constituting the incorporators of this corporation, including the persons named hereinabove as the First Directors of this corporation, have executed these Articles this 10th day of December, 1974.

Norman Ray Berge
NORMAN RAY BERGE

Eugene Rippen
EUGENE RIPPEN

James Charles Cirner
JAMES CHARLES CIRNER

Peter Colin Brickey
PETER COLIN BRICKEY

Robert G. Middleton
ROBERT GORDON MIDDLETON

Dave Brodie
DAVE BRODIE

Kenneth Miller
KENNETH MILLER

STATE OF CALIFORNIA)
) ss.
COUNTY OF SANTA CLARA)

On this 17th day of December, 1974, before me, a Notary Public in and for said County and State, personally appeard NORMAN RAY BERGE, known to me to be the person described herein, whose name is subscribed to and who executed the above instru-

BY-LAWS
OF
CALIFORNIA HISTORICAL RADIO SOCIETY,
A NON-PROFIT CORPORATION

AS AMENDED AT THE MEMBERSHIP AND DIRECTORS MEETING OF NOV. 12, 1988

SECTION NO.	SECTION	
		ARTICLE I
1.01	NAME AND PRINCIPAL OFFICERS:	The name of this organization shall be "California Historical Radio Society, a Non-Profit Corporation." Principal office and other places of business shall be designated from time to time by the President with the advice and consent of the Board of Directors.
1.02	OTHER OFFICES:	The corporation may also have offices at such other places, within or without the State of California where it is qualified to do business, as its business may require and as the Board of Directors may from time to time designate.
		ARTICLE II
2.01	MEMBERS:	There shall be a first class of memebers who are the Directors of the Corporation. All other members shall be associate members and have no voting rights, except as specified herein with respect to the selection of Directors and officers.
2.01(a)	NON-LIABILITY OF MEMBERS:	No member of the corporation shall be personally liable for the debts, liabilities, or obligations of the corporation.

		ARTICLE III
3.01	DIRECTORS:	The authorized number of Directors shall be seven (7).
3.02	TERM OF OFFICE:	The Directors named in the Articles of Incorporation shall hold office as follows: ONE YEAR TERMS with first term ending the second Tuesday in March, 1976: Norman Ray Berge and Eugene Rippen; TWO YEAR TERMS with first term ending the second Tuesday in March, 1977: James Charles Cirner and Peter Colin Brickey; THREE YEAR TERMS with the first term ending the second Tuesday in March, 1978: Robert Gordon Middleton, Dave Brodie, and Kenneth Miller, and until the election (or appointment) of their successors, the terms of office of Directors other than those named in the Articles shall be for three (3) years, commencing on a first Tuesday in March. Should a membership meeting not be held on a first Tuesday in March, otherwise terminating directorships shall continue until the election of new directors at a membership meeting.
	SELECTIONS:	Directors, other than those named in the Articles of Incorporation, shall be selected by a majority of the Directors holding office at the time a vacancy occurs before the end of a normal term, or if it is deemed necessary to increase the number of Directors as provided for under Article III hereinabove; otherwise, directors shall be selected by vote of the membership.
3.04	POWERS:	(a) Subject to any restrictions or limitations imposed by law, by the Articles of Incorporation or by these By-Laws, the powers of the corporation are vested in the Board of Directors.
3.04	DELEGATION OF POWERS:	The Board of Directors may delegate the performance of duties and exercise of

powers to officers and agents of the corporation from time to time as it shall by resolution determine.

3.04 MANAGING PROPERTY FOR INCOME: (b) The Board of Directors may, as it shall from time to time determine by resolution, delegate in whole or in part the matter of controlling, managing, investing and disposing of the property of the corporation for the purpose of earning an income therefrom to one (1) or more trust companies or banks duly authorized to conduct a trust or banking business in this State.

TRUST FUNDS: (c) The Board of Directors may as it shall from time to time determine by resolution establish one or more trust funds for the purpose of furnishing investments to itself or to any religious, beneficial, charitable, or educational institution affiliated with it or to any organization, society or corporation holding funds or property for the benefit of any of the foregoing, or holding funds for the purpose of supporting a teacher or any building or buildings used by or owned by any of the foregoing whether holding such funds or property as fiduciary or otherwise, subject to the terms and conditions set forth in the Articles of Incorporation of this corporation.

3.05 VACANCIES: (a) Vacancies in the Board of Directors shall exist (1) on the death or resignation of any Director, (2) whenever the number of Directors authorized is increased and (3) on failure of the appointing power or powers to appoint the full number of Directors authorized.

DECLARATION OF VACANCY: (b) The Board of Directors may declare vacant the office of a Director (1) if he is declared of unsound mind by an order of court or (2) if within ninety (90) days after notice of his selection he does not accept the office either in writing or by attending a meeting of the Board of Directors. The Board shall notify the appointing power forthwith of any declaration of vacancy.

VACANCIES: (c) Vacancies caused by the death, resignation or disability of a Director or Directors shall be filled by a majority of

the remaining Directors, though less than a quorum, as hereinafter defined, or by the sole remaining Director. Vacancies created by an amendment to the Articles of Incorporation increasing the number of Directors authorized shall be filled as provided hereinabove.

TERM OF OFFICE: (d) A person appointed to fill a vacancy in the Board of Director shall hold office for the unexpired term of his predecessor or until his death, resignation or disability as in these By-Laws provided.

3.06 REDUCTION OF NUMBERS OF DIRECTORS: A reduction of the number of Directors authorized shall not result in the removal of any Director prior to the expiration of his term of office.

3.07 COMPENSATION: No member of the Board of Directors shall receive any compensation from the corporation for serving his directorship.

3.08 MEETINGS: (a) Meetings shall be held at the principal office of the corporation or at such place or places within or without the State of California which have been designated from time to time by resolution of the Board of Directors. In the absence of such designation, meetings shall be held at the principal office of the corporation, provided that any such meeting held elsewhere shall be valid if held on the written consent of all trustees, given either before or after the meeting and filed with the secretary of the corporation.

REGULAR MEETINGS (b) Regular Directors meetings shall be held at least three times a year in conjunction with other activities, or otherwise, and with reasonable notice to the membership.

SPECIAL MEETINGS: (c) Special meetings of the Board may be called by the President, or if he is absent or is unable or refuses to act, by the Vice-President, or by any two Directors, and such meetings shall be held at the place within or without the State of California, designated by the person or persons calling the meeting, and in the absence of such designation at the principal office of the corporation.

NOTICE: (d) The secretary or other person designated by the President shall deliver written or printed notice of the time and place of meetings of the Board to each director personally or by United States mail or telegram, addressed to him at his address as it appears on the books of the corporation, at least seven (7) days prior to the date of the meeting provided, however, that notice of all regular meetings is hereby dispensed with.

QUORUM: (e) Four (4) Directors shall constitute a quorum for the transaction of business.

MAJORITY ACTION AS BOARD ACTION: (f) Every act or decision done or made by a majority of the Board of Directors present at a meeting duly held at which a quorum is present is the act of the Board of Directors, unless the law, the Articles of Incorporation of this corporation, or these By-Laws require a greater number.

VALIDATION OF MEETING DEFECTIVELY CALLED OR NOTICED: (g) The transactions of any meeting of the Board, however called and notice of wherever held, are as valid as though the meeting had been duly held after proper call and notice, provided a quorum is present and provided that either before or after the meeting each of the Directors not present signs a waiver of notice, or consent to holding the meeting, or an approval of the minutes thereof. All such waivers, consents or approvals shall be filed with the corporate records or made a part of the minutes of the meeting.

CONDUCT OF MEETINGS: (h) Except as otherwise expressly provided for in these By-Laws (or in the Articles of Incorporation of this corporation) or by law, no business shall be considered by the Board at any meeting at which a quorum is not present and the only motion which the Chair shall entertain at such meeting is a motion to adjourn. However, a majority of the Directors present at such meeting may adjourn from time to time until the time fixed for the next regular meeting of the Board.

(i) All meetings of Directors shall be governed by ROBERTS' RULES OF ORDER, as such rules may be revised from time to time, insofar as such rules are not inconsistent or

in conflict with these ByLaws, with the Articles of Incorporation of this corporation or with law.

(j) Meetings shall be presided over by his absence by a Vice President, or in the absence of both, by a chairman chosen by a majority of the Directors present. The secretary of the corporation shall act as secretary of the Board of Directors. In case the secretary is absent from any such meeting, the presiding officer may appoint any person to act as secretary for the meeting.

3.09 ACTION BY UNANIMOUS CONSENT WITHOUT MEETING: Any action required or permitted to be taken by the Board of Directors under any provision of law may be taken without a meeting, if all members of the Board shall individually or collectively consent in writing to such action. Such written consent shall have the same force and effect as the unanimous vote of such directors. Any certificate or other document filed under any provision of law which relates to action so taken shall state that the action was taken by unanimous written consent of the Board of Directors without a meeting and that the By-Laws of this corporation authorize the Directors to act and such statement shall be prima facie evidence of such authority.

3.10 NON-LIABILITY DIRECTORS: The Directors shall not be personally OF liable for the debts, liabilities or other obligations of the corporation.

ARTICLE IV

OFFICERS

4.01 NUMBER AND TITLES: The officers of this corporation shall be President, one (1) Vice President, a Secretary and a Treasurer, Assistant Treasurer, and Editor-in-Chief, and other officers as the Board of Directors may in its discretion from time to time appoint. One person may hold two or more offices, except those of President and Secretary.

4.02 ELECTION AND TERM OF OFFICE Officers other than those appointed at the discretion of the Board shall be chosen annually by the Membership and each such officer shall hold office from the March

meeting of the Board with the resigns or is removed or is otherwise disqualified to serve, or until his successor shall be elected and qualified, whichever occurs first. Officers appointed at the discretion of the Board shall serve such terms, have such authority, and perform such duties as are provided in these By-Laws or as maybe prescribed from time to time by the Board.

4.03 REMOVAL AND RESIGNATION: Any officer may be removed either with or without cause, by a majority of the Directors at the time in office. Any officer may resign at any time by giving written notice to the Board of Directors or to the President or to the Secretary of the corporation. Any such resignation shall take effect at the date of the receipt of such notice or at any later time specified therein, and unless otherwise specified therein, the acceptance of the resignation by the Board shall not be necessary to make it effective.

4.04 VACANCIES: Any vacancy caused by the death, resignation, removal or otherwise of any officer other than those appointed at the discretion of the Board, shall be filled by the Board of Directors for the unexpired portion of the term. Vacancies occurring in the office of officers appointed at the discretion of the Board may or may not be filled as the Board shall determine.

4.05 DUTIES OF THE PRESIDENT: The President shall be the chief executive officer of the corporation and shall in general, subject to the control of the Board of Directors, supervise and control all of the business and affairs of the corporation. He shall perform all duties incident to his office, and such other duties as may be required by law, by the Articles of Incorporation of this corporation, or by these BY-Laws, or which may be assigned to him from time to time by the Board of Directors. He shall preside at all meetings of the Directors.

4.06 DUTIES OF THE VICE PRESIDENT: The Vice President shall, in the absence or disability of the President or in the event of his refusal to act, perform all the duties of the President and when so acting, shall have the powers of, and be subject to

the restrictions on the President. He shall have such other powers and perform such other duties as may be imposed by law, by the Articles of Incorporation of this corporation or by these By-Laws, or as may be prescribed from time to time by the Board of Directors.

4.07 DUTIES OF THE SECRETARY: The secretary shall:

(a) Certify and keep at the principal office of the corporation the original or a copy of these By-Laws as amended or otherwise altered to date.

(b) Keep at the principal office of the corporation or at such other place as the Board of Directors may order, a book of the "minutes of all Meetings" of the Directors, recording therein the time and place of holding, whether regular or special, how authorized, the notice given, the names of those present and the proceedings thereof.

(c) See that all notices are duly given in accordance with the provisions of these By-Laws or as required by law.

(d) Be custodian of the records and of the seal, if any, of the corporation and see that the seal is affixed to all duly executed documents, if necessary, the execution of which on behalf of the corporation under its seal is authorized by law or by these By-Laws.

(e) Keep at the principal office of the corporation a "Membership Book" containing the name and address of each member Director, and in any case where membership has been terminated, record such fact in the book together with the date on which the membership ceased.

(f) Exhibit at all reasonable times to any Director of the corporation, or to his agent or attorney, or to any person or agency authorized by law to examine them on request therefor, the By-Laws, the Membership Book, the minutes of any proceedings of the Directors and the other records of the corporation.

(g) In general, perform all duties incident to the office of Secretary and other duties as may be required by law, by the Articles of Incorporation of this corporation, or by these By-Laws, or which may be assigned to him from time to time by the Board of Directors.

4.08 DUTIES OF THE TREASURER: The Treasurer subject to the provisions of Article 6 of these By-Laws shall-

(a) Have charge and custody of, and be responsible for, all funds and securities of the corporation and deposit all such funds in the name of the corporation in such banks, trust companies, or other depositaries as shall be selected by the Board of Directors.

(b) Receive and give receipt for moneys due and payable to the corporation from any source whatever.

(c) Disburse or cause to be disbursed the funds of the corporation as may be directed by the Board of Directors, taking proper vouchers for such disbursements.

(d) Keep and maintain adequate and correct accounts of the corporation's properties and transactions, including accounts of its assets, liabilities, receipts, disbursements, gains and losses.

(e) Exhibit at all reasonable times the books of account and financial records to any Director of the corporation or to his agent or attorney, or to any person or agency entitled by law to examine the same, on request therefor.

(f) Render to the President and Director, whenever he or they request it, an account of any or all of his transactions as Treasurer and of the financial condition of the corporation.

(g) If required by the Board of Directors, give a bond for the faithful discharge of his duties in such surety or sureties as the Board of Directors shall determine.

(h) In general, perform all duties incident to the office of Treasurer and such other

duties as may be required by law, by the Articles of Incorporation of this

4.09 The compensation of officers shall be as established from time to time by resolution of the Board of Directors.

ARTICLE V

5.01 FINANCE COMMITTEE: (a) The corporation shall have a Finance Committee which shall consist of two (2) of the Directors appointed by a majority vote of the Board of Directors.

(b) Committee members shall serve a term as prescribed by the Board of Directors.

(c) Any vacancy on the committee shall be filled by a majority vote of the Board of Directors and any member so appointed shall serve the remainder of the term of his predecessor.

(d) The committee members shall select one of their number to act as chairman of the committee.

(e) The committee shall establish rules and regulations for its meetings and meet at such times and places as it deems necessary.

(f) No act of the committee shall be valid unless approved by the vote or written majority of its members.

(g) The committee shall keep regular minutes of its proceedings and report the same to the Board of Directors from time to time as the Board may require.

(h) The matter of controlling, managing,, investing and disposing of the property of the corporation for the purpose of earning an income therefrom, as distinguished from the matter of applying property and funds to charitable, educational, and eleemosynary purposes, shall be exclusively in the Finance Committee unless otherwise prescribed by resolution of the Board of Directors.

5.02 COMMITTEES: By resolution of the Board of Directors there shall be provided for specific purposes or activities such committees as may be

10 1

required. Chairmen and members of such committees shall be appointed by the Board of Directors and they shall serve at the pleasure of the Board.

ARTICLE VI

6.01 EXECUTION OF INSTRUMENTS: The Board of Directors, except as otherwise provided in these By-Laws, may by resolution authorize any officer or agent of the corporation to enter into any contract or execute and deliver any instrument in the name of and on behalf of the corporation, and such authority may be general or confined to specific instances. Unless so authorized no officer, agent or employee shall have any power or authority to bind the corporation by any contract or engagement or to pledge its credit or to render it liable pecuniarily for any purpose or in any amount.

6.02 CHECKS AND NOTES: Except as otherwise specifically determined by resolution of the Board of Directors, as provided in Section 6.01, or as otherwise required by law, checks, drafts, promissory notes, orders for the payment of money, and other evidences of indebtedness of the corporation shall be signed by the Treasurer and countersigned by the President of the corporation, or by the Chairman of the Finance Committee.

6.03 DEPOSITS: All funds of the corporation shall be deposited from time to time to the credit of the corporation in such banks, trust companies, or other depositories as the Board of Directors may select.

ARTICLE VII

7.01 CORPORATE SEAL: The Board of Directors may adopt, use and at will alter a corporate seal, embodying the "Sky Terrier" logo or otherwise, and noting the date of incorporation of February 28, 1975.

7.02 The seal, if adopted, shall be affixed to all corporate instruments, but failure to affix it shall not affect the validity of any such instrument.

7.03 The seal, if adopted, shall have embossed

thereon an emblem and wording to be selected and approved by the Board of Directors.

ARTICLE VIII

8.01 FISCAL YEAR The fiscal year of the corporation shall be the calendar year.

ARTICLE IX

9.01 EFFECTIVE DATE OF BY-LAWS: These By-Laws shall become effective immediately upon their adoption.

Amendment to these By-Laws shall become effective immediately on adoption or at such later time as specified in the amendment.

9.02 AMENDMENT OF BY-LAWS: Subject to the limitations contained in the Articles of Incorporation of this corporation and to any provisions of law applicable to the amendment of By-Laws of non-profit corporations, these By-Laws or any of them, may be altered, amended or repealed and new By-Laws adopted by vote or written consent of a majority of the voting members of the corporation.

9.03 CERTIFICATION AND INSPECTION: The original or a copy of these By-Laws as amended or otherwise altered to date, certified by the Secretary of the corporation shall be recorded and kept in a book which shall be kept in the principal office of the corporation and such book shall be open to inspection by the members at all reasonable times during office hours.

ARTICLE X

10.01 CONSTRUCTION: As used in these By-Laws:

(a) The present tense includes the past and the future tenses, and the future tense includes the present.

(b) The masculine gender includes the feminine and neuter.

(c) The singular number includes the plural, and the plural number includes the singular.

(d) The word "shall" is mandatory and the word "may" is permissive.

(e) The words "Directors" and "Board" as used in relation to any power or duty requiring collective action mean the "Board of Directors."

ARTICLE XI

11.01 NON-VOTING MEMBERS: The members, other than those who are voting members, and therefor also directors, shall be associate members, whose qualifications shall be determined by the Board of Directors.

11.02 ASSESSMENT: Dues, fees and subscriptions payable by Associate Members shall be determined by resolution of the Board of Directors.

ARTICLE XII

12.02 SPECIFIC PURPOSES: The specific purposes of the corporation shall be: To foster the preserving, collecting, restoring, display and publication of information concerning Broadcast Radios, Broadcasting, Radio Compounds, Wireless, Test Equipment, all with major emphasis upon its historical value scientifically, functionally and socially. To carry out those purposes by collecting, preserving and restoring the related items both in kind and through secondary sources such as literature, tapes, recordings and photography, to display and cooperate with educational entities including public museums, and to publish texts, books, and periodicals.

AS AMENDED BY THE AMENDMENTS TO THE BY LAWS OF THE CALIFORNIA HISTORICAL RADIO SOCIETY ADOPTED UNANIMOUSLY AT THE MEMBERSHIP AND DIRECTORS MEETING OF NOV. 12, 1988:

Paul Bourbin, President

Bartholomew Lee, Vice President and General Counsel.

##

BULLETIN #1

March 15, 1975

THE CALIFORNIA HISTORICAL RADIO SOCIETY

Norman Berge -President
Peter Brickey-First Vice-President
Dave Brodie - Second Vice-President
Gene Rippen - Secretary & Legal Counsel

Jim Cirner - Treasurer
Ken Miller - Editor
Larry LaDuc, Jr.-Historian

The California Historical Radio Society has been founded by a group of seven individuals who feel that California has needed a society of this type for a long time.

All of the activities for the early radio enthusiast has been in the mid-West and on the East Coast with nothing for the collector in the western United States.

With the formation of the California Historical Radio Society we plan to have activities for all areas of radio collecting. We plan to have two yearly swap meets and conventions. Our Society meetings will be held monthly, with the first meeting tentatively scheduled for the month of May 1975.

We are working on our first quarterly journal, due to be published on the first of May. Anyone wishing to write an article on any subject of early radio is encouraged to contribute. We also will run ads for any items to be sold, traded or wanted.

Our base of operation will be at the newly developed San Jose Historical Museum. We are planning on a rotating display in the very near future. All sets and accessories will come from the collections of the members. All sets and accessories will be displayed in locked glass cases. Naturally, everything will be insured by the Society. All displays will be acknowledged with the collectors name.

All ads and articles are to be mailed to the California Historical Radio Society, % San Jose Historical Museum, 635 Phelan Avenue, San Jose, CA. 95112.

I am looking forward to seeing you at the first meeting in May.

Norman Berge
Norman Berge
President
California Historical Radio Society
635 Phelan Avenue
San Jose, CA. 95112

BULLETIN #2

June 15, 1975

THE CALIFORNIA HISTORICAL RADIO SOCIETY

Norman Berge - President
Peter Brickey - First Vice-President
Dave Brodie - Second Vice-President
Gene Rippen - Secretary & Legal Counsel

Jim Cirner - Treasurer
Ken Miller - Editor
Larry LaDuc, Jr. - Historian

Now that we are in our third month as a society, our membership has grown to forty members. The board of directors are very pleased with the response in such a short time.

As you all know, we are working diligently to get our first publication in the mail. We hope you will bear with us as we work on our journal. It is a very difficult job since none of us are experienced in the publishing field.

Our editor, Ken Miller, is doing a fine job, but he needs help. Is there anyone who would care to volunteer their services to help Ken? Our new historian, Larry LaDuc, Jr. will be needing help. We are going to start correlating a library on all radio manufacturers in California and western United States. If we can get help for Ken and Larry then the board of directors can turn to other areas to help make our society a success.

At the moment, our first Meeting and Swap Meet is just a short time away. We are looking to the latter part of July. When we have our meeting place arranged, everyone will be notified at least two weeks in advance. As our society progresses, we will be sending out bulletins when special events or pertinent issues arise.

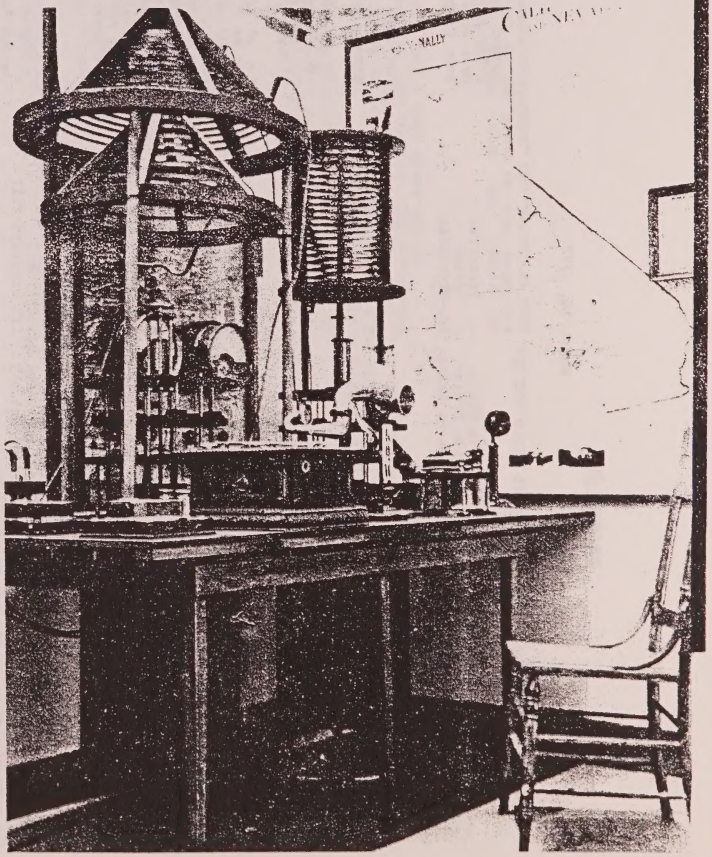
Norman Berge
Norman Berge
President
California Historical Radio Society
635 Phelan Avenue
San Jose, CA. 95112

OFFICIAL JOURNAL

VOL.1 NO.1

SEPT., 1975

CHRS CALIFORNIA HISTORICAL RADIO SOCIETY



Historian's Notes

By Larry LaDuc

As the Historian of the California Historical Radio Society I want to welcome you all to the society and I hope we can make the club functional and informative as well as enjoyable to all.

In this Historian's Corner, as well as future ones, I hope to pass on historical information gathered from the membership and also other informative tips of use to the new and old collector alike.

Do the names Federal, Dixie, Gilfillan, Jackson-Bell, Remler or Magnavox ring a bell? These were just a few of the early radio and parts manufacturers located in California. The C.H.R.S. would like to compile a historical file on as many of the early radio companies of California as possible.

Any information, audio; visual or otherwise you may wish to submit, for copying, or donation may be sent to the club or your Historian, Larry LaDuc, 484 Arleta Avenue, San Jose, CA., 95128.

FOR THE RESTORER

Now you can completely restore your Magnavox antique receivers, amplifiers, and speakers to their original appearance including the manufacturers 5 color logo.

Magnavox tooled up and reproduced the original decal used on early Magnavox instruments manufactured in Oakland, CA.

The limited edition Magnavox Antique Logo No. 171347-1 may be ordered from your Magnavox Parts Center, 2645 Maricopa Street, Torrance, CA., 90503. The price is $1.50 each and you had better get at least one while the supply lasts.

I am proud to be a contributor to the California Historical Radio Society magazine and I hope the membership will contribute items to go into the future magazines. I am sure that a good magazine will help in our collecting!

Until next time, Happy Hunting!

ANTIQUE RADIO PUBLICATIONS

Horn Speaker . . . . . .Monthly newspaper on radio and phonograph collecting.
Cranshaw Publications
P.O. Box 12
Kleberg, Texas 75145
Sample - 50¢

Antique Radio Topics . . . . . .Frequently published newsletter on antique radio collecting.
P.O. Box 42
Rossville, Indiana 46065
Sample - 50¢

Radio Dial . . . . . .Published quarterly by the Historical Radio Society of America. Mainly for the collector of early radio programs on tape.
Box 190
Cloquet, Mn. 55720

The Classic Radio Newsletter . . . . . .Mainly for Scott, Mc Mundro, Silver, Lincoln, Fisher, etc.
Puett
3008 Abston Drive
Mesquite, Texas 75149
Sample for S.A.S.E.

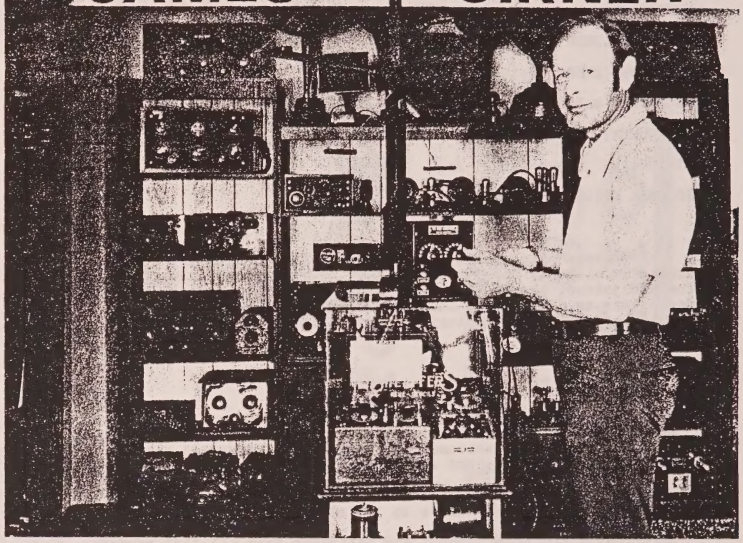
Antique Radio Corner . . . . . .Regular feature of the bi-monthly magazine - Elementary Electronics available at your news-stand.
By James Fred

Radio Fact Sheets . . . . . Also available thru Elementary Electronics. Sheets list nationwide clubs, public and private museums, etc.
Free for S.A.S.E. write 229 Park Avenue South, New York, N.Y. 10003

The Antiquers Directory . . . . . Lists names and addresses as well as interests of collectors nationwide.
Midco Enterprises
Dept. Arp. Box 15370

COLLECTOR SPOTLIGHT

THIS ISSUE: JAMES - CIRNER



This portion of my collection shows some of my early radios, ranging from a J. J. Duck detector (1910) to a Marty (1927) three dial tune AC set. As you can see from the picture, I am a general collector preferring to have as many different types of sets as I am able to find. In the last couple of years I have been specializing in crystal sets and one, two and three tube sets. The crystal set featured in the picture, with me connecting ear phones to it, was manufactured by the Trio Radio Laboratory in Oakland, California around 1922. The crystal mount was made of early automobile two prong light bases and mounted in an automobile light socket. I was fortunate and able to buy the remainder of the Trio Radio Laboratory parts, two complete radios and five crystal sets. I researched the company out the best I could and figure they were in business for a very short time as a manufacturer. I believe these are probably the only surviving sets they ever made. There are still two sets available for trade. I also collect early AC sets up through 1941 and instruments.

CALIFORNIA
HISTORICAL RADIO SOCIETY

635 Phelan Avenue
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VICE-PRESIDENT: Dave Brodie

VICE-PRESIDENT: Peter Brickey

SECRETARY & LEGAL COUNSEL: Eugene Rippen

TREASURER: James Cirner

HISTORIAN: Larry LaDuc, Jr.

JOURNAL EDITOR: Kenneth Miller

For membership correspondence address the Treasurer, James Cirner, 13366 Pastel Lane, Mt. View, CA. 94040. Articles and non-commercial ads for the journal should be submitted to the Editor, Kenneth Miller, 1950 Cooley Avenue, Palo Alto, CA. Historical data for copying or donation should be sent to the Historian, Larry LaDuc, Jr., 484 Arleta Avenue, San Jose, CA. 95128.

NOTICES

Our second meeting will be held in San Jose on August 21st. All members will be notified by mail of the time, place, and agenda. Visitors are always welcome, as they are our potential new members. Previous visitors are not eligible to attend club functions until they join the club.

We need a club photographer to take official photographs at our meets. Anyone interested please write to the club headquarters or contact any of the officers.

Articles for this journal are solicited from all club members. Any items of interest, such as restoration hints, information on early radio broadcasts and personalities, anecdotes about the pioneers, etc. will be greatfully accepted.

Bob Middleton has donated a number of reprints of an early Young & McCombs catalog (circa 1919) to the club. These are available free to club members who send a stamped self-addressed envelope. The envelope should be at least 6" x 9". 30¢ postage should be sufficient for first class postage.

PRESIDENT'S MESSAGE

As the California Historical Radio Society reaches its fourth month, the response has been excellent, with forty members to date.

Seven members are out of the Los Angeles area. If we can reach twenty-five members from the Los Angeles area, then we can plan for two conventions a year, one in Los Angeles and one in northern California.

We have set our goals to meet the many areas of radio collecting. If we can get additional volunteers to assist, then we can make this a very successful society.

We hope you will be as eager to help us make our society a success as we were when it began.

Your President,
Norman Berge
Norman Berge

CHRS

BIOGRAPHIES

Our president, Norm Berge, has been interested in radio since age thirteen. Although he has been collecting for only four years, he has amassed an impressive collection of books, magazines, tubes, speakers, microphones, and over 150 vintage radios. When he started working on radios in the 1940's he was given his first load of scrap radio parts from "Uncle Al". Norm is a member of A.W.A., A.R.C., and the Indiana Historical Radio Society. He is employed by the engineering department of the Stanford Medical Center.

Vice-President Dave Brodie is interested in repairing, restoring, and collecting antique radios. He has been an amateur radio operator since 1955 with call letters W6PGQ. He is a member of the A.R.R.L., A.W.A., A.R.C., and Ex "G" Radio Club. Dave is a Certified Public Accountant and retired partner of Cooper's and Lybrand C.P.A.'s.

Our second vice-president, Peter Brickey, works for Hewlett-Packard and has been interested in radio and wireless gear since the early 1960's. He began to collect seriously in 1971. His collection runs from early wireless to mid 1940 consoles. He prefers the consoles of the mid 1930's and unusual sets of the 1920's. Peter is a member of A.W.A. and A.R.C.

Gene Rippen is our secretary. His background as a practicing lawyer in San Jose has proved invaluable in laying the groundwork for the club. Gene started tinkering with radios in the 1940's and at the age of 16 operated a thriving repair shop. In addition to his radio collection he has an impressive 78 rpm record collection. He has made a spare time business of his interest in antiques by operating an antique shop in Los Gatos. In addition to a First Class Radio-telephone Operator's license, Gene holds an advanced class ham license, call WB6SZS.

Jim Cirner, our treasurer, works for N.A.S.A. at the Ames Research Center, and operates a part-time repair business for both television and antique radios. He collects almost everything related to radio, including crystal sets, signs, instruments and parts. He enjoys restoring old radios and equipment to good working order. Jim started repairing in 1948 and collecting in 1950. His collection is now in the vicinity of 250 sets. He is a member of A.W.A., A.R.C., and the Indiana Historical Radio Society.

Larry LaDuc, Jr., our historian, collects battery, crystal and A.C. sets of all makes and models. He also collects service literature, and radio books, and magazines. He even has a collection of antique electric fans. He has been collecting radios about two years and has about 30 sets, mostly A.C. He enjoys hunting radio items at Flea markets, garage sales, etc. He is employed by Lockheed. He formerly held amateur radio call WB6BTK.

Our editor, Ken Miller, is employed by Varian Associates. He has a Master's Degree in Electronic Engineering and has a background of part-time work for several radio and television stations as an announcer and engineer. In addition to being licensed as a First Class Radio-telephone Operator, he is a ham with call WB6BJL. Ken has a small collection of battery and crystal sets and enjoys restoring them to working order. He is a member of A.W.A.

OFFICIAL JOURNAL

VOL. I DEC., 1975 NO. 2

CHRS CALIFORNIA HISTORICAL RADIO SOCIETY

CALIFORNIA HISTORICAL RADIO SOCIETY INC

635 Phelan Avenue
San Jose, CA. 95112

PRESIDENT: Norman Berge

VICE-PRESIDENT: Dave Brodie

VICE-PRESIDENT: Peter Brickey

SECRETARY & LEGAL COUNSEL: Eugene Rippen

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THE SOCIETY

The California Historical Radio Society is a non-profit corporation registered in the state of California, and was formed to promote the interests of California vintage and antique radio enthusiasts. Our goal is to provide the opportunity to exchange ideas and information on the history of radio (in California especially.) We hope to be of service to those interested in such areas as collecting of equipment, literature, and programs, etc., and restoration of early gear. Regular meetings and swap meets are scheduled in the San Jose area, with additional meets planned for Southern California in the future. We now have 55 members from throughout the state (and a few from out of state.) As we grow so do the benefits to our members. Tell your friends about us!

THE JOURNAL

The Official Journal of the California Historical Radio Society is published quarterly and is furnished free to members. Our first issue was published in September 1975 and copies are still available to new members. Articles for the Journal are solicited from all members. Any items of interest, such as restoration hints, information on early radio broadcasts and personalities, anecdotes about the pioneers, etc., will be gratefully accepted. Anyone interested in editing a section of the magazine on a regular basis should contact the editor. This can relieve our editor of a great deal of work and insure maximum attention to your area of particular interest.

COLLECTOR SPOTLIGHT

THIS ISSUE:

NORMAN BERGE

This picture is a small part of my collection. It has been in storage for the past 2½ years so please excuse my unpainted walls. I am a general collector. My collection includes crystal, battery and AC receivers, my earliest set being a Clapp-Eastman one tube regenerative receiver which was purchased at the flea market for the ridiculous price of $5.00. As you can see my collection also includes other items of special interest, such as microphones, speakers, and tubes. (I am also a 78 rpm record collector.)

A REPAIRMAN

by

H. Brams

"Hello? You want to speak to Herb Brams, the antique radio repairman? Yes, that's me. You say you have a Philco cathedral radio that's not working? Sure, bring it in; I'm sure that it can be fixed." And so another radio starts on the road back to life. My customers are always surprised to hear that I spend full time repairing old radios and they ask how I got into such a strange field. Here is my story.

I have always had a vivid imagination and as a child I liked listening to music, looking at pictures, or reading books. One day, when I was about ten, my older sister brought home a crystal set that she had made at school. I looked at this strange contraption, with its big coil of wire, sliding brass contact and galena crystal and catswhisker, but it didn't look like anything special. Then I put on the head phones and diddled with the slider and the crystal and, all of a sudden, I heard -- The Lone Ranger! My God, this thing was alive! Moving the slider to different positions, I could get music or news or comedy programs. I was enthralled. There was something magical about radios. From then on I was an avid radio listener.

A few years later my father sent me to a private school. Life there was rather strict; they didn't allow you to have radios. They felt it would interfere with your studies. I missed my old radio friends and so started thinking about how to make a radio for myself. The challenge was to build something small enough to be hidden away in my pocket but sensitive enough to pick up all the stations clearly (this was in the days before transistor radios were readily available.) I started with a crystal set, then made a one-tube regenerative set, then a superregenerative one, but they all were unsatisfactory in one way or another. My interest in radios slackened and I became interested in high fidelity equipment instead.

I went on to college and then to graduate school, studying biochemistry. In the laboratory, there was plenty of electronic equipment which would, on occasion, break down. With my knowledge of electronics, I could usually repair these myself and so not interrupt my work. One day, another worker told me he had an old radio that didn't work and asked if I would take a look at it. I said I would, and so he brought it in. It was an old cathedral radio and it looked very strange to me. I took the chassis out and found that there were no mysterious old parts in it, just ordinary resistors, capacitors, coils, and transformers. These were easy enough to check, and I found several defective components, mainly capacitors, which I replaced. After I had made these repairs I plugged in the set and it worked. Surprisingly, it played extremely well. My friend was very happy. He told me he knew of many people who had old radios that didn't work and who couldn't find anyone to repair them. My interest was aroused. I wondered what other old radios looked like, what kind of circuits they used, how well they played and what they sounded like. I decided to put an ad into the local paper--Antique Radio Repair.

It is now seven years later. I have repaired about five hundred sets, mostly AC sets from the late 20's to early 40's. It is a full-time occupation and I average about two or three sets a week. I have never lost interest in fixing them; the feeling that there is something magical about a working radio has never left me. It still is a thrill to plug in a completed set and to hear it come alive.

It has always seemed strange to me that people could have collections of non-working radios sitting around lifeless like so many orange crates. To me a radio isn't a radio unless it's a radio. I want to know how well it works, what it sounds like, and what unusual operating features it has. Therefore, it has always been my policy that I should not just get the sets working, but to examine all parts of the set, replace all defective or doubtful components, and to put the set into the best possible working condition that I can. As a result, stations come in clearly and without static, shadow meters and magic eye tubes work, motorized dials spin with ease, pushbuttons bring in selected stations right on the nose, and muting circuits effectively suppress interstation noise. The set once more is a radio. As you can see I take professional pride in my work, and this policy has paid off. Out of the five hundred or so sets that I have fixed, only about five or six have ever come back requiring additional work, that usually being replacing a burned-out tube or noisy volume control. It is interesting that, after being restored, all the sets, even little four tube TRF cheapies, work surprisingly well. The best-playing sets seem to be the medium-priced ones. Very fancy sets seem to be too sensitive and pick up a lot of noise, and high fidelity sets often don't sound very good; they have an overpowering "auditorium" type sound.

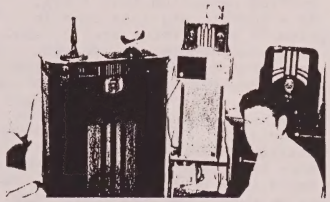
If there is any fly in my ointment it is the conflict between preservation and improvement. It is very tempting to take an old TRF set, add an automatic volume control circuit to prevent blasting on strong stations or change the detector to a diode type to improve the sound quality. However, under the influence of several dedicated collectors I have come around to the opinion that preservation is the right goal. The original characteristics of a set are unique and should not be "improved" upon. They are of historical value and if one wants a better-playing set, then why not go out and buy a modern transistor radio? The sets should play as they played originally.

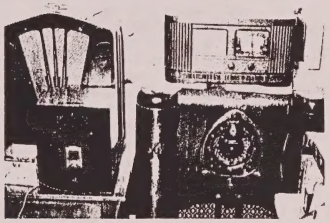
Therefore, I try to leave the outward appearance of the chassis unchanged, not removing the old filter cans or drilling holes in the chassis to mount parts underneath. Similarly, I modify the circuit as little as possible. I even go to the trouble of using brown cloth-covered line cord on the older sets to restore the original appearance. The underside of the chassis is a different story. Very few people will see this part of the set and since the set may need servicing at some later time, the goal I aim for is ease of servicing. Let's be frank: in most old radios the wiring and parts layout under the chassis is one god-awful mess. If the owner of an old radio ever had to take his set to a local TV repair shop for repair, they wouldn't even know where to begin. I could write a whole book on techniques to make servicing easier but let me mention just a few basic principles

here. Rearrange parts to put them close to the tubes they are associated with. Arrange them so that they follow their electrical order in the circuit. Leads should be as short as possible and go directly to the next associated part. Use terminal strips to mount the parts, mounting the strips in the original holes in the chassis. Leave the parts exposed rather than putting them in original containers so that they will be easily identified as to their location in the circuit and will be accessible for future testing or replacement. Use color-coded wire for the various high and low voltage lines, AVC, antenna wire, etc. Use modern metallized-film capacitors - these take up much less room and are easier to install than the old molded-paper types. Initially, this approach may take more time than usual but after a little practice it facilitates the rewiring of a set enormously. It is astonishing how well the underside of a chassis can be cleaned up, and the result is a nice open chassis with plenty of space to work in and placement of parts that shows their electrical order in the circuit - truly a work of art!

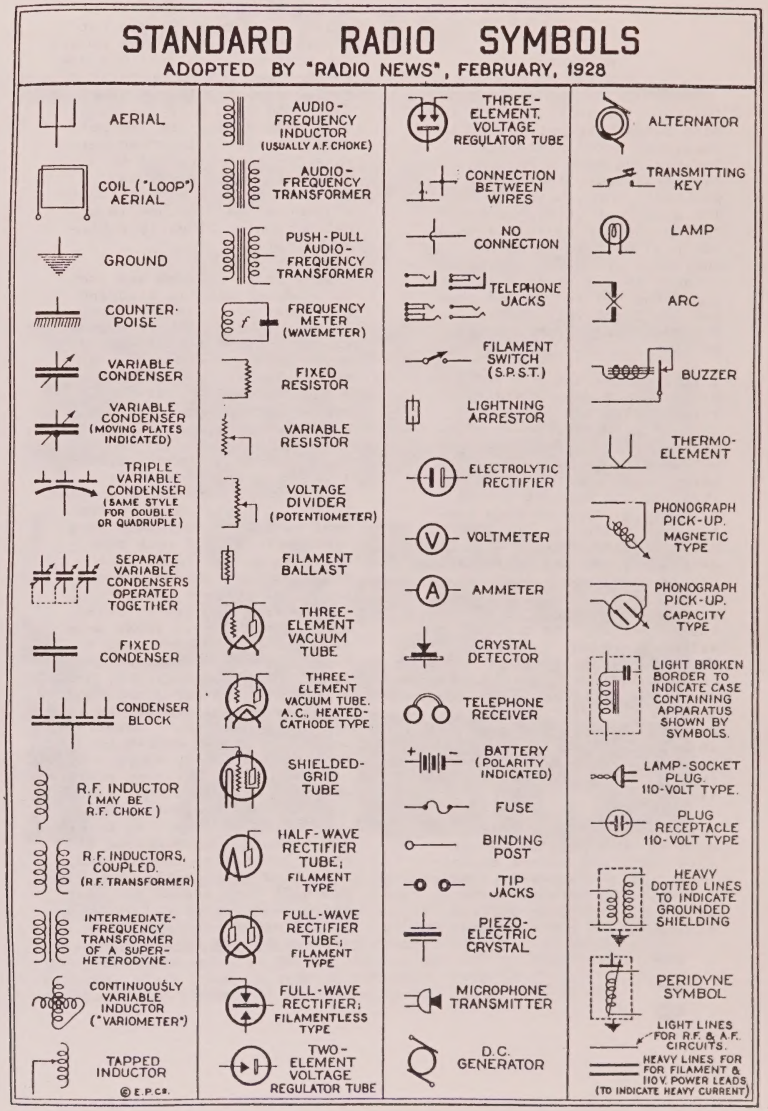
By now you are probably thinking "This guy must have a fabulous collection." No, strangely enough, I have never become a collector. I like to see what different sets look like but I just don't want to keep them around for any length of time. Perhaps the fact that I live in a small studio apartment and can't help seeing them around me all the time explains my peculiarity. Familiarity breeds contempt, as they say. My own personal taste is for radios of the middle and late 30's, especially Philco radios, but I like any set that looks unusual or has unusual features. I like battery-operated farm sets because they are usually large (to hold the batteries) and are a challenge to get working. Lately, I have also become interested in plastic radios.

And now, let me show you my apartment.





Photos by Geo. Durfey

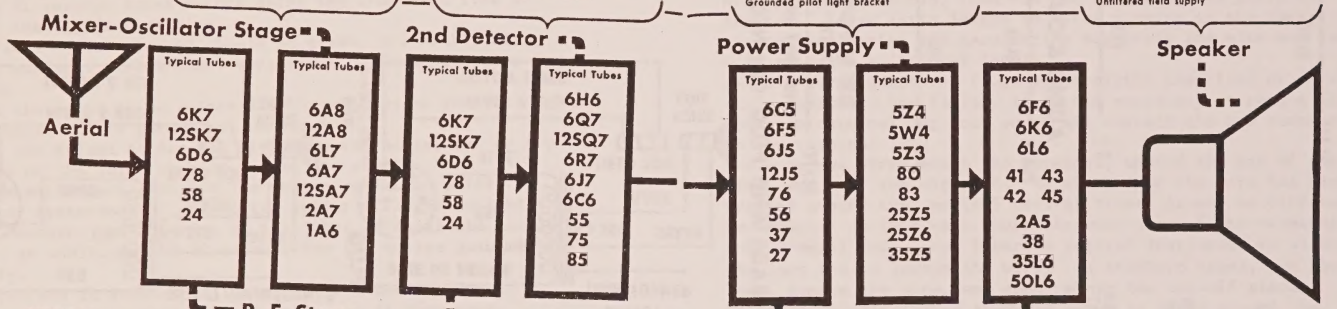


COMMON RADIO TROUBLES STAGE-BY-STAGE

With the growing scarcity of radio servicemen, you may find it necessary to trace down and cure the troubles in your own set. This handy "trouble-shooting" chart will help you do so.

The first move in tracing trouble is to have all tubes tested. *After* they have been eliminated as the possible cause of the trouble is the time to give thought to the parts in the receiver.

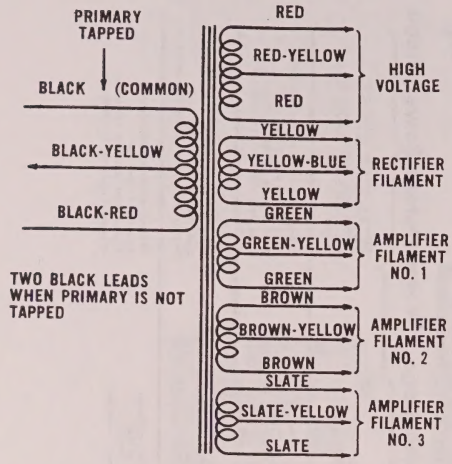
The common symptoms are listed at the left of the chart, and the probable difficulties for each individual stage listed to the right—each stage in the receiver being represented by a block in which is listed the tube types commonly associated with that stage.



SYMPTOMS	R. F. Stage	I. F. Stage	1st Audio Stage	Output (Power) Stage
Inoperative	Open or shorted R.F. coil Band switch contacts dirty Shorted tuning or trimmer condenser Open plate decoupling resistor or choke	Open I. F. coil Plate decoupling resistor open Shorted trimmer condenser Primary or secondary bypass condenser shorted	Plate load resistor open Open audio coupling condenser Shorted plate bypass condenser Open cathode resistor	Primary of output transformer open Open cathode bias resistor Shorted audio coupling condenser Secondary of output transformer shorted or open
Intermittent Fading	Shorting trimmer condenser Loose connecting lugs on R.F. coil Leaky plate or screen bypass condenser Band switch making poor contact	Open or shorting grid bypass condenser Lift wire on lugs corroded Trimmer condenser shorting A.V.C. network defective	Defective audio transformer primary Open volume control Leaky grid or plate coupling condenser Defective plate load resistor	Defective primary on output transformer Open cathode bias resistor Shorting audio coupling condenser Open secondary on input transformer
Oscillation or Noisy	Rotor contacts on tuning condenser dirty Open cathode or screen bypass condenser Shorted bias resistor Aligned too sharply	Screen bypass condenser open I. F. transformer out of alignment Shorted cathode bias resistor Poor coil contacts at lugs	Shorted cathode bypass condenser Plate decoupling resistor shorted Open plate bypass condenser Primary of coupling transformer opening	Open cathode bypass condenser Defective cathode resistor Leaky audio coupling condenser High resistance from primary to secondary
Distortion or Hum	Shorted filament bypass condenser Antenna too long, causing overload Shielding making poor contact Shorted antenna coupling condenser	Open cathode bypass condenser Stage out of alignment Too sharply tuned oscillation High resistance between primary and secondary of I. F. transformer	Shorted grid or plate coupling condenser Cathode bypass condenser shorted Audio transformer open or shorting High resistance from primary to secondary of audio transformer	Shorted cathode bypass condenser Screen grid circuit open Shorted turns on output transformer If pushpull tubes may be unbalanced

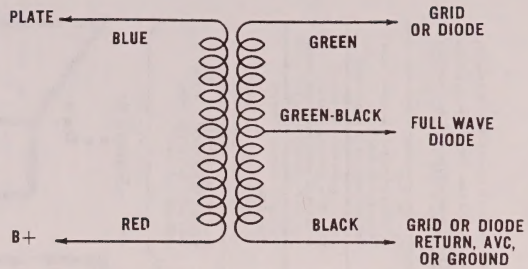
SYMPTOMS	Mixer-Oscillator Stage	2nd Detector	Power Supply	Speaker
Inoperative	Oscillator plate resistor open First I. F. transformer primary open Shorting or open oscillator trimmer condenser Open plate choke coil	Plate load resistor open or shorted Shorted trimmer condenser Control grid lead shortening to shield Open plate filter choke	Shorted electrolytic condenser in power supply Power supply filter choke open Open voltage divider in power supply Shorted or open power transformer secondary	Open voice coil Secondary of output transformer open Voice coil leads open Voice coil leads shorted to pole piece
Intermittent Fading	Poor insulation on oscillator trimmer condenser Open grid return resistor High resistance at lugs of oscillator coil Dirty band switch contacts	Defective volume control Load resistor bypass condenser shorting High resistance contact in I. F. transformer secondary R. F. bypass condenser shorting	Shorted or leaky filter condenser Loose contacts on voltage divider Defective line switch Filter choke shorting to ground	Voice coil lugs making poor contact Metal filings grounding voice coil Secondary of output transformer opening Field coil connections making poor contact
Oscillation or Noisy	Open grid coil Cathode bypass condenser open or leaky Shield on grid leads corroded or open Decoupling resistor shorted	Open plate or grid bypass condenser Defective volume control Out of alignment Defective plate load resistor	Open filter condenser Defective voltage divider Filter choke leaking to ground Leaky bypass condenser from rectifier tube to ground	Metal filings grounded voice coil Warped cone Voice coil rubbing on pole piece Voice coil winding loose
Distortion or Hum	Leaky plate bypass condenser Shorted or leaky cathode bypass condenser Open grid filter condenser Oscillator coil misaligned	Defective volume control Leaky audio coupling resistor Plate load resistor too high Leaky plate bypass condenser	Open or shorted primary bypass condenser Centertap on filament windings open Open or leaky output filter condenser Grounded pilot light bracket	Field coil open or shorting Hum bucking coil shorted or reversed Voice coil rubbing on pole piece Unfiltered field supply

EIA Color Codes

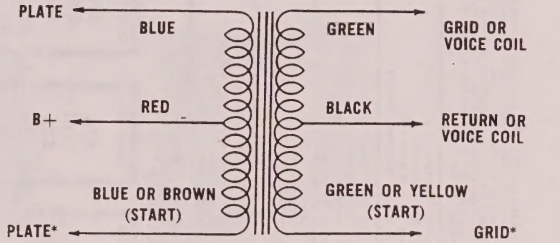


POWER TRANSFORMER

I-F TRANSFORMERS

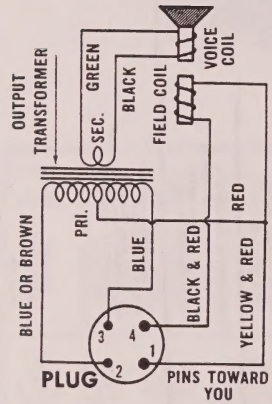


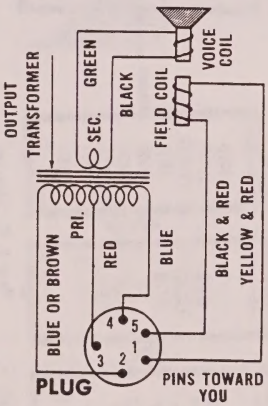
AUDIO & OUTPUT TRANSFORMERS

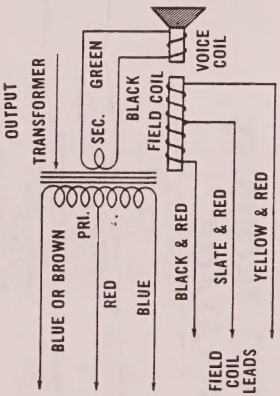


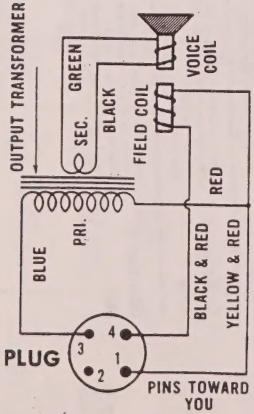
*FOUND ONLY ON PUSH-PULL PRIMARY OR SECONDARY WINDINGS

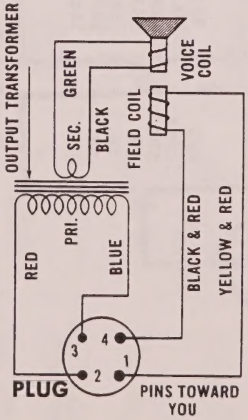
SPEAKER LEADS AND PLUG CONNECTIONS

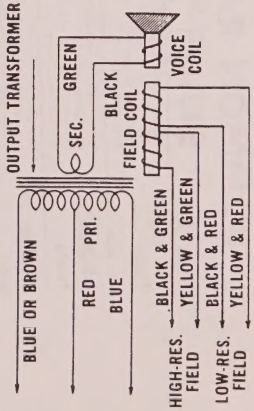












CHICAGO STANDARD TRANSFORMER CORPORATION 3501 ADDISON STREET CHICAGO 18, ILLINOIS

Printed in U.S.A.

SOLDERING HINTS

by H. Brams

Materials needed:

Soldering irons - 25 watt pencil type or gun, 80-100 watt iron
Rosin core solder
Soldering aid or similar pointed tool
Solder sucker or solder wick
Small electric fan

You should already have some knowledge of, or practice in, proper soldering techniques.

——Mount a small fan near your workbench to blow the solder fumes away from your face.
——If your iron has a removable or screw-in tip, loosen and tighten it several times before using the iron each time to prevent the tip from seizing.
——Surfaces to be soldered should be clean, preferably with a shiny surface. Use a small wire brush or fine sandpaper for cleaning.
——Heat the parts to be soldered with the iron so that the solder melts on the parts, not on the iron.
——When the molten solder has flowed on the parts, dab or tap the iron on the joint to help spread the solder.
——Allow sufficient time for the molten solder to solidify. The shiny appearance of the molten solder will turn slightly dull. However, the interior of the joint may still be liquid so wait an additional 15-30 seconds for the entire joint to solidify.
——If you are in doubt that the parts have been soldered together securely, wiggle the wires to see if they move.
——To remove excess solder, melt the solder and remove it with a solder sucker or soak it up with solder wick. Alternatively, pinch the glob of molten solder with needle-nose pliers and lift it off (I find this method is very fast and efficient).
——To solder components to a metal chassis directly, first rub the chassis with sandpaper to remove all dirt and oxidation until you are down to bright clean metal. Use a heavy-duty soldering iron (80-100 watts). Terminal strips can be mounted quickly and easily by soldering them directly to the chassis, and the outside appearance of the chassis is not changed.
——Mount capacitors and other components with identifying markings in full view so that it is easy to identify and locate them.
——The covering on modern capacitors may be very thin. Take care not to burn these components with the iron.
——Wires going to a terminal should run through the hole (or around the terminal, if there is no hole), turned back once in a "J" turn, and pinched tight. Avoid winding wires around a terminal several times; this makes them difficult to remove.
——Where many wires are to be connected to a terminal, the wires least likely to be changed or removed should be at the bottom. Wires most likely to be changes should be on top--i.e. in the most accessible location. This arrangement makes it easy to remove components that may fail at a later date. If there are several holes in the terminal, run leads from components most likely to fail (e.g. electrolytic capacitors) through a separate hole so that they can be removed easily without disturbing the other wires.
——To attach a wire to a terminal closed by solder, heat the terminal to melt the solder and use a soldering tool or similar pointed instrument to make a hole.
——Wires running to electrolytic capacitor cans: since these cans are likely to be replaced at a later date, avoid connecting many wires to the terminals. Instead, run the wires to a nearby terminal strip, then run one wire from the strip to the can. Leave extra length in wires running to the cans; constant soldering and desoldering may break the wire and you will need the additional length.
——If a large component (e.g. electrolytic capacitor or metal strip resistor) has failed, it is not necessary to remove it. Solder a terminal lug foot on it and connect the new components to the terminal lug.
——To remove wires, heat the terminal, unwind the end of the wire, and pull the wire out. If the end of the wire has been wrapped around the terminal several times, it may be difficult to unwind. In this case, push the wire through the terminal to form a small loop, then insert a pointed instrument to widen the loop and to loosen the wire. In stubborn cases, cut the loop, remove the wire, and then remove the cut-off piece. Alternately, simply cut the wire where it bends around the terminal. For those cases where the wire cannot be removed from the terminal without a great deal of trouble or where there is danger of breaking the component it is attached to, cut the wire about an inch from the terminal and make connection to the end of the cut wire.
——To make sure that a new replacement part is attached to the same points as the old one, try this: put the replacement part close at hand. Cut the old component out, leaving a length of the old wires running to their respective connection points. These will indicate clearly where the new component is to be connected. Remove one of the old leads and solder one lead of the new component in place. Then remove the other old lead and solder the remaining lead of the new component in place. In this way, one will not forget where the original part was connected.

RESTORATION HINTS

by H. Brams

An Antique Finish

Many inexpensive radio cabinets were made of a cheap light wood. Once the dark finish has been stripped off one has the problem of trying to make the cabinet dark again. Wood stains often do not give a dark enough effect. One can obtain a fairly satisfactory dark finish by dipping a wad of cloth in dark brown paint or lacquer and dabbing it on the cabinet to create a mottled or marbelized effect.

Buzzing Power Transformers

If a power transformer buzzes audibly, tighten all the screws on the transformer. Installing a fiber shim can quiet a buzzing lamination. If buzzing persists, remove the transformer from the chassis and dip it into a can of freshly-prepared epoxy-resin. Remove the transformer, let it drain, and set it on an aluminum sheet for a day or so to allow the resin to harden.

Replacing Filter Capacitors

When replacing filter capacitors in a set, be sure to disconnect the old capacitor. Otherwise, it may short out at some later time. Mount the capacitor away from any power resistors as the heat produced from them can severely limit the life of the capacitor. Similarly, if the capacitor is connected to a power resistor, leave the lead to the resistor as long as possible to reduce the amount of heat transferred to the capacitor.

Mounting a Chassis into a Cabinet

After replacing a chassis into its cabinet it is often difficult to line up the screw holes in the chassis with those of the mounting shelf. Insert a long narrow screwdriver blade through the shelf and move the chassis around until the blade passes through the holes in the chassis. It then is very easy to push the mounting screws through the shelf and have them catch on the threads of the chassis. Similarly, with speakers, line up two of the speaker holes with the mounting screws. This greatly reduces the chance of puncturing the cone with the remaining screws while trying to line them up with their respective holes.

Insulating with Heat-Shrink Tubing

Use heat-shrink tubing to cover and insulate splices in wire. The tubing can be shrunk by carefully rubbing a hot soldering iron along the length of the tubing. If insulation is crumbling off a wire, unsolder one end, remove the old insulation, slip a piece of tubing over the wire, and resolder.

Speaker Grill Cloth

A good substitute for speaker grill cloth may be made by obtaining a loosely-knit fabric used for lining dresses and stiffening it by spraying it with lacquer or by soaking it in wood stain and letting it dry. Most regular fabrics are too closely-woven to let the sound through.

Inoperative Superheterodyne Radios

If an apparently normal superheterodyne radio fails to tune in any stations, measure the oscillator grid voltage. A normally-operating oscillator should have a negative grid voltage.

Fixing Vernier Drives

A Philco vernier-type tuning shaft was slipping and would not turn the tuning condenser shaft on which it was mounted. Degreasing the assembly to increase friction did not help. The problem was solved by filing down the base of the outer metal cup that pressed the three ball bearings against the inner tuning shaft. This allowed a new portion of the inner surface of the cup to press against the bearings.

Non-Deflecting Magic-Eye Tubes

Very often a magic-eye tube will not deflect well because the one megohm resistor in the socket has burned out. There are two main types of eye-tube sockets commonly encountered. The first is made by Amphenol and consists of a plastic socket pressed into a black metal shell. The socket may be removed by inserting a wide blade screwdriver between the socket and the shell and twisting to separate the two pieces. Spraying a lubricant around the shell will make the job easier and reduce the possibility of cracking the socket.

The other type of socket, more frequently encountered, is made by the Hugh E. Eby Corporation and consists of one piece of plastic. To disassemble this type, remove the fiber insert that covers the metal pin contacts by placing the socket face down on the table, inserting the tip of a narrow blunt screwdriver through the back of the socket and pushing or tapping the screwdriver until the insert comes out. Take care to hold back the wires to the socket so that the socket terminals inside stay in place. Carefully unsolder the resistor and replace it with a one megohm ½ watt unit, making sure it is arranged like the old one and not shorting to any adjacent terminals. Also replace any badly deteriorated wiring to the socket. Make sure the resistor is seated down into the socket as far as it will go and that all contacts are seated in their respective places. Take the insert, note that it has a key, and press it firmly back into place, using both thumbs, until you hear it snap in.

Alignment Tips

When you align a TRF or superheterodyne radio, set the tuning condenser at a point where no station is received. Connect an AC VTVM with a 0-30 volt scale between plate and ground of the output tube. In this way a good peak can be obtained without an ear-splitting howl from the speaker. If the set is in good condition, simply clipping the lead of the signal generator to an insulated part of the antenna or converter grid lead (if the set has an RF stage) will provide enough signal for alignment. In older sets it may be necessary to connect the generator output through a small capacitor (about 47 mmfd) directly to the RF or converter grid. If the IF frequency is known, set the generator at that point. For sets of the mid-30's and later, this is generally 455 kc. Earlier sets commonly used 175 kc or 260 kc. If the IF frequency is not known, increase the frequency of the generator

upwards from about 125 kc. If a peak is heard, turn the tuning capacitor back and forth. If the peak is tuned out, it is not the correct IF frequency. When the correct IF peak has been established try turning the generator to twice the frequency. If the signal is still heard, the true IF frequency is the new one; on the former frequency the set had been responding to a second harmonic of the frequency of the generator. In all cases, especially with sets that have low IF frequencies, it is important to make sure that the correct IF frequency has been found and the set is not just tuned to a station frequency or harmonic of the generator. If the correct IF frequency has been found, the signal will be heard regardless of where the tuning condenser is set.

Cleaning Speakers

Electrodynamic speakers often have small bits of metal in the voice coil gap causing a raspy or buzzing sound. Gently push the cone in near the center. If you hear scratching sounds there is dirt in the gap. This can often be removed by blowing in compressed air from the front of the speaker. If this does not work it may be possible to remove the cone from the frame and clean the gap. Unsolder the voice coil wires from the frame. Remove the screw that holds the center of the cone to the pole piece. Remove the screws holding the retainer that holds the outer edge of the cone to the frame. If the edge of the cone is glued to the metal frame, try softening the glue with acetone. Carefully lift the cone out. Run pieces of scotch tape around in the gap to catch the tiny slivers of metal that may be present. Make sure that all of these have been removed and also that no pieces are stuck to the voice coil on the cone itself. Replace the cone in the gap in the same position as originally. Cut four strips of thin cardboard and insert them in the gap outside the coil. This is to center the coil in the gap. Replace all the screws and remove the strips. Determine if the voice coil is rubbing by pressing down on the center of the cone and listening for rubbing sounds. I also tap the cone lightly with the eraser end of a pencil and listen for buzzing sounds that indicate unglued areas.

If the cone cannot be removed from the frame by the above methods, cut the cone out around the rim. Make a substitute outer suspension from a ring of ¼ in. sheet gray polyurethane foam and glue it to the cone with Duco cement. Replace the cone in the gap and insert spacers as before. Glue the outer edge of the foam to the metal speaker frame. This method should be used only as a last resort since the lifetime of the foam is probably only 5-10 years.

Speaker Repair

A frequent problem of old radios is a rattling speaker. If this is simply due to a small tear in the cone, the torn edges can be reattached with a small amount of glue. If a small portion of the cone is missing, graft in a piece of paper from a junked speaker and glue it into place. Don't use tape of any sort to repair a cone, for it will invariably dry out, rattle, and eventually fall off. A good glue for speaker repair is the Wilhold aliphatic resin (White) glue.

Often, someone has attempted to "fix" a rattling speaker by wadding up some cotton or newspaper and jamming it in between the speaker frame and back side of the cone. This eliminated the rattle by severely limiting the excursions of the cone but had the disadvantage of seriously reducing the audio quality of the speaker. If this is the case, remove the obstruction by carefully sliding it out sideways. The cone will probably have been deformed, with a prominent "bubble" where the obstruction had been. Using an eye dropper full of water, carefully soak the bubble and lightly press the cone back into its original shape. Then dry the cone with a hair blow dryer. After the cone is dry, try to find out what caused the rattle in the first place.

A common cause of rattling speakers is that the outer edge of the cone has become unglued from the metal basket. This can be found easily by pressing up and down on the speaker gasket (the ring covering the outer edge of the cone) or by lightly pressing up and down on opposite sides of the cone and noticing whether there is any up and down movement of the gasket with respect to the basket rim. Some speakers do not have a gasket, making it easier to determine where the cone has become unglued. Once a loose spot has been found take a syringe full of GC Speaker Cement, insert the needle under the loose edge and inject a small quantity of glue between it and the basket rim. Be careful not to get any of the glue on the flexible edge of the cone or it will stiffen the cone suspension. Allow the glue to dry, using clamps as needed. An alternative to GC Speaker Cement is aliphatic resin glue (white glue); however, do not use any epoxy glue, Eastman 910, or weatherstrip adhesive. These glues are difficult to remove if the speaker has to be reconed.

If it is necessary to repair the flexible outer edge of the cone, do not use any of the above-mentioned glues. Instead, use GE Clear Silicone Rubber. On extremely dry or cracked edges apply a very thin layer of the rubber over the entire edge. It is very important that it be applied as thinly as possible to avoid stiffening the suspension and thereby decreasing the efficiency of the speaker.

Often there are problems associated with the "spider" - the device at the center of the cone, either inside the cone or outside it, that centers the cone in the magnetic gap. Many speakers used paper outside spiders. These are affected by humidity much more so than the fiber or phenolic spiders. They become misshapen, causing the cone to be displaced inwards or outwards. As a result, the cone may strike the pole piece on heavy bass passages or more power will be required to drive the speaker since the voice coil is not seated fully in the magnetic gap. If this is the case, use the eye dropper and moisten both the paper spider and the entire outer flexible edge of the cone. Remove the voice coil dust cover with GC speaker cement thinner or, if necessary, by cutting it out with an Exacto knife. Carefully install three or more speaker shims at equal distance around the perimeter of the voice coil and then center the cone in its proper position so that the spider appears level. The shims should hold the speaker in the correct position. Carefully dry the speaker with the blow dryer, then remove the shims and replace the dust cover.

When mounting the speaker in the cabinet, do not over-tighten the mounting nuts. This may warp the basket causing the voice coil to rub, and it can cause the ornamental mounting screws to crack the cabinet speaker grille.
For complete reconing of speakers, the following place is recommended: S.R.S. Enterprises, 2409½ Colorado Ave., Colorado Springs, Colorado 80904. Send the speaker by UPS.

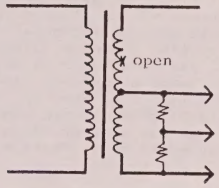
Repairing Open Windings

Open windings in coils and transformers is a common problem but repairing these is not as difficult as it appears. The following method is effective in a high percentage of cases. Disconnect the leads of the open winding. Attach the output of a regulated variable high voltage power supply to the winding. Slowly increase the voltage, while monitoring the current. At some point the broken ends of the winding may arc, welding themselves together. The current through the coil will jump but is limited by the regulator tube in the power supply to about 100 ma. In any case, turn the voltage down and then turn it up and down several times to see if the weld is permanent. Also measure the resistance of the winding to be sure it has the correct value.

Occasionally the primary section of an RF or oscillator coil will be open. These are usually non-tuned sections consisting of about twenty turns of wire on the outside of the coil form and so are easily rewound if these cannot be restored by the shock treatment. Remove the coil and locate the terminals for the open section. With a pin, carefully lift up the end of the wire and start unwinding it. If the break is near the end, you may only have to resolder the wire to the terminal; a few less turns will not greatly affect the performance of the coil. Sometimes, however, a corrosion spot has developed and many breaks are present. In this case unwind the entire section, noting carefully the number of turns involved and the direction of winding. Then rewind the section with wire of similar size, winding in the same direction with about the same number of turns. Scramble winding appears satisfactory. Secure the new section in position with melted paraffin wax. Carefully scrape the insulation off the ends of the wire with a knife or very fine sandpaper and resolder the wire to the terminals.

Occasionally, the coil form itself has absorbed moisture, allowing high voltages to leak into the grid circuits. In this case, bake the coil for about an hour at 110° C, then dip it into melted paraffin wax. If the coil cannot be restored, substitute a RF choke for the winding and couple the signal into the good part of the coil with a small (about 47 mmfd) mica capacitor.

If half of a center-tapped grid winding on an audio transformer is open, the remaining half may be converted to center-tapped operation as shown below.



Resistors are 100K - ½ W

BALLAST TUBES AND RESISTANCE LINE CORDS

From about 1933 to 1943 many table radios and some floor models were designed to operate directly from line voltage. These were called AC-DC or "transformerless" sets. The voltage for heating the tube filaments was supplied directly from the line. Since line voltage is 117v AC and the tube filaments required only about 6 or 12v (25, 35, or 50v for many rectifier and output tubes) a resistor had to be provided to drop the line voltage to the proper value to operate the filaments. The problem was simplified somewhat by connecting the filaments in series so that each filament acted as a resistor, dropping the voltage somewhat for the remaining filaments. In most cases, however, the line voltage was greater than the sum of the voltages required to heat the tube filaments and so an additional resistor was required to drop the remaining voltage.

Example: A typical five-tube set of the mid-1930's used three 6.3v tubes and two 25v tubes connected in series. The total voltage drop was (3 x 6.3) + (2 x 25) = 69v. Line voltage is 117v. Therefore, (117 - 69) = 48v must be dropped.

The resistor dropping the voltage often had to dissipate considerable power and so would become extremely hot. In many cases the resistor was built into the line cord in the form of a resistance wire running the entire length of the cord (resistance line cords). Since the heat generated was distributed along the entire length of the cord, the cord became only moderately warm and so posed little danger. In other cases the resistor was built into a tube called a baliast tube. These were glass or metal tubes that looked like ordinary radio tubes and plugged into a socket on the chassis. They were often identified by a code, such as the following:

RMA BALLAST CODE

Example: type B-K-55-B-G

The first letter (B) indicates a ballast tube but may not appear. The second letter (K) indicates the type of pilot light used in the set:

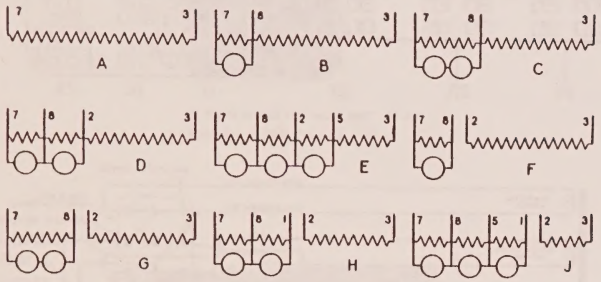
K - a 6-8v 0.15A bulb is used.
L - a 6-8v 0.25A bulb is used.

In practice, any type of bulb can be used without harm to the set.

The number (55) designates the voltage drop in the resistor, including that for the pilot light.
The letter following the voltage drop (B) indicates the circuit

and base wiring (see below).
The last letter (G) indicates a glass tube and may be disregarded. An "X" after the lamp-designating letter indicates a four-prong base e.g. LX55B.

In the wiring diagram below the numbers stand for the prong connections of an octal socket.

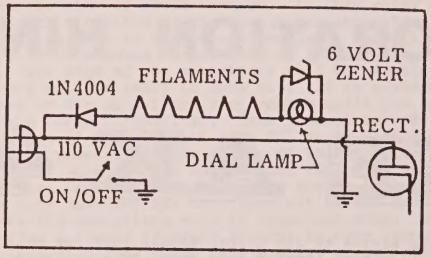


With glass four-prong base ballast tubes, a much-used system was to have a number indicating the overall resistance. Example: type 185R4. The unit has an overall resistance of 185 ohms. To convert this to the RMA code multiply the resistance by 0.3 to obtain the voltage drop: 185 x 0.3 = 55v. The tube is equivalent to type KX55B.

The section of resistor across which the pilot lights are connected serve to provide an electrical path in case the lamps burn out. Also, it helps to absorb the surge in current that occurs after the set is turned on while the tubes are warming up.

In the early 1940's tubes were designed with filaments that operated on higher voltages so that a set of these connected in series could operate off the line voltage with no dropping resistor being required.

Burned-out ballast tubes should not be replaced by resistors mounted in a set because a great deal of heat is generated. Sometimes the ballast tube can be opened and resistors mounted inside. This is hazardous, however, since resistors with a large power rating are required (15-20 watts), much heat is generated, space inside the tube is limited, and there is danger that connecting wires will short to each other or present a shock hazard. In many cases the ballast tube or resistance line cord can be replaced with a silicon diode, with a zener diode across the dial lamps to prevent them from burning out.



The power dissipated in a ballast tube or resistance line cord can be found by multiplying the voltage drop across them by the current drawn by the tube filaments.
Example: The five-tube set considered previously required a voltage drop of 48v. The current drawn by the tube filaments is 0.3A. The power dissipated is (48 x 0.3) = 14.4 watts.

References:

CHRS Journal, June 1979
CHRS Newsletter, Nov-Dec 1983

RADIO ENTERS THE HOME

"I have in mind a plan of development which would make radio a household utility in the same sense as a piano or a phonograph. The idea is to bring music into the home by wireless. The receiver can be designed in the form of a "radio music box" and arranged for several different wavelengths, which should be changeable with the throwing of a single switch or pressing of a single button...Receiving lectures at home can be made perfectly audible; also events of national importance can be simultaneously announced and received. This proposition would be especially interesting to farmers...They could enjoy concerts, lectures, music, recitals, etc., which may be going on in the nearest city."

- David Sarnoff, 1916, in a memo to his superior while working for American Marconi.

RESTORATION HINTS

THE AK 40

The following advice by Jim Cirner should have you well on the way to restoring your Atwater Kent Model 40 A.C. radio to working condition.

Remove power supply and tuner section from metal case. Make a continuity check of power transformer, chokes, resistors, interstage transformers, volume control and RF transformers, etc. The detector resistor in the bottom of the bakelite panel of power supply is a high failure item. It should measure 250 thousand ohms. Assuming all steps above have been taken and necessary corrections have been made, we will start with the capacitor problems. As most experienced collectors know, old paper-type capacitors in this case close to fifty years old, cannot be trusted. They all should be replaced with new capacitors. It is very risky to run a set without recapping entirely. I made this mistake with a Radiola 17. I replaced a bad resistor and the set took off and sounded great. I left my shop with the set playing and went into the house. Fifteen minutes later I smelled smoke. The shop was full of heavy black smoke and flames were coming out of the set. The B + paper capacitor shorted, burning up the 80 rectifier and power transformer. What a mess! The fun part of the job is removing the tar out of the power can to replace the capacitors. Of course, the speaker choke is potted in the tar right above the power transformer capacitors. There are many ways of removing tar. Set power transformer in an oven or on a hotplate, etc. The trouble with these methods is that you melt all the tar from around the power transformer and choke which is not necessary and you increase the chances of accidental damage to the components. For this reason, many collectors hate to tackle potted power supplies.

Now we will go through my way of doing the job and maintaining control over removing the necessary tar, only from the capacitor area. Remove the first set of nuts to disconnect power cable from power supply panel. Remove the second set of nuts from the panel assembly on top of power supply. This will allow you to move the panel but not lift it. The capacitor bank and speaker choke are located on the end of the power supply container that does not have the tube socket mounted on it. Refer to power supply diagram in this article. Disconnect speaker choke, and capacitor leads. This will allow you to lift power supply panel out of the way so capacitors can be melted out. Set power supply metal cabinet up as shown in the picture. I use aluminum foil to direct melting tar into a disposable metal container such as a coffee can. We have one positive thing going for us at this point. The metal cabinet has a metal divider between the chokes and transformer section and the capacitor bank. There are three filter capacitors and two by-pass capacitors and a speaker choke in the model 40 in this section. Direct shrink tubing heat gun that has a temperature of 550° F. at the capacitor section about 1" - 2" away from the tar. After about 15 minutes of melting tar the speaker choke will be free. Carefully fish out the choke with long nose pliers and

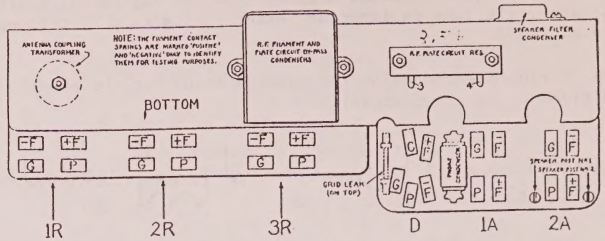


Fig. 70. Test Chart for Models 40, 42, 52

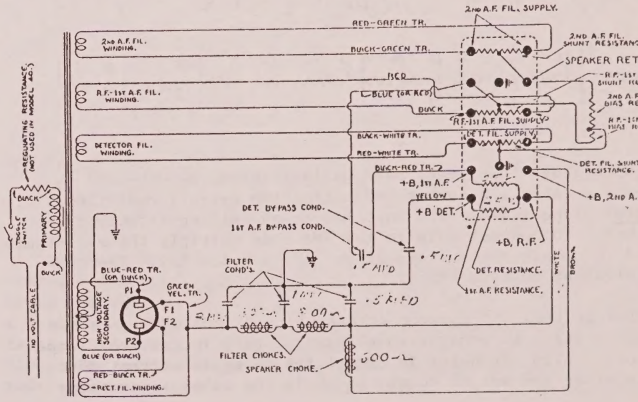


Fig. 63-A. Schematic diagram of power unit in Models 40, 42, 44, and 52. See page 69 for description of this unit. Some early units of this type have color scheme similar to unit in Model 38 set. Note that colors as now standardized correspond with the colors of set-cable leads.

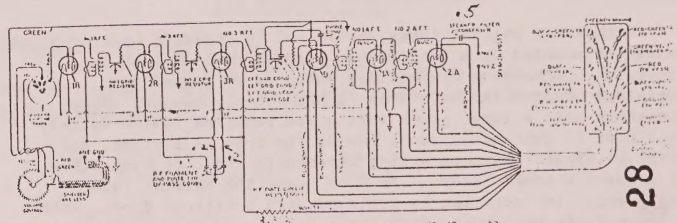
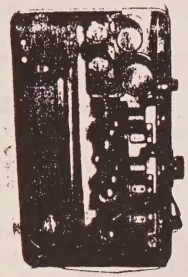
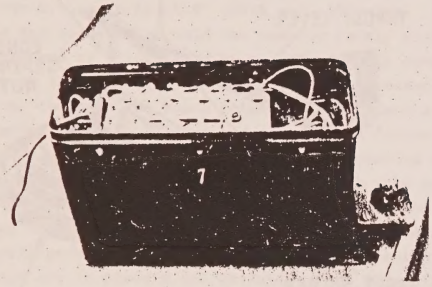


Fig. 71. Wiring Diagram of Models 40, 42 and 52

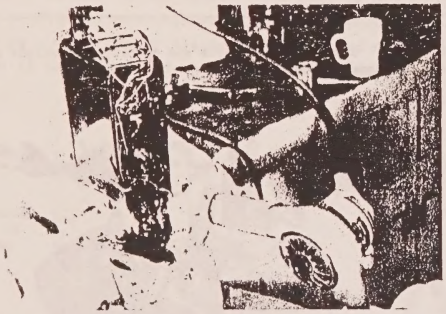
Model 52 does not have the shielded antenna lead, but is provided with two twenty-foot leads which are connected to the volume control, black antenna and black-green tracer for ground.



Inside View of AK 40



The power supply can removed from the set



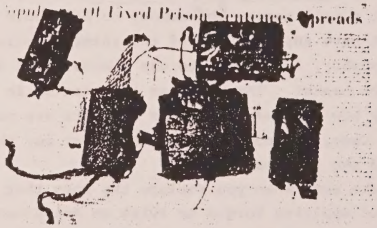
Melting out the tar with a heat gun

set it to one side of metal cabinet. At this point all that is left in this section is the five paper capacitors. Continue applying heat to capacitors section. It will require around 15 to 20 minutes to get most of the tar out of this section. The edge of the capacitors will be visable long before they will be ready to come out. It is necessary to apply heat to the capacitors long enough until you can move them with a large screwdriver. Take a small screwdriver and bend the last $\frac{1}{4}$" of the shank to a 90^0 angle. With this tool you can pierce the side of one of the capacitors and pull it out. Once you get one out the rest come easy. Now the hard part is done. Set the power supply cabinet straight and take your heat gun and melt the rest of the tar so the area where the capacitors were is clean and even. Give the power supply a couple of hours to cool to room temperature. Replace the capacitors using values shown in the schematic diagram of this article. To be safe, use 450 VDC rated capacitors for the filters. The two by-pass capacitors can be 200 VDC. This should complete power supply restoration. I suggest that you install a fuse block in primary of power transformer. One amp. QB should do it.

Tuner Section

I will make the same assumptions as I did with the power supply section. You have made an ohm meter check of components and made necessary corrections. The RF filter and plate capacitor are mounted in a metal container under the RF chassis. You have two choices. Remove metal capacitors container and with your heat gun melt old capacitors and slip new ones in the old container. The second method is throw container away and mount capacitors independently. The value of the plate by-pass capacitor is .2 MFD 200 VDC. The filament by-pass capacitors are .2 MFD 25 VDC. The speaker filter condenser mounted on front side of the RF chassis is in a sealed container. If you wish to save the container, unsolder the lid with a 200 watt iron to remove old capacitor. The value is .5 MFD at 400 VDC. The heat gun works very well for melting old AF transformer out of its container. I don't bother to rewind them. I replace the old transformer with a modern 4-1 transformer, hiding it in the original container.

This should complete repairs of the model 40. There is very little you can do for RF alignment. There is no trimmer capacitors on the tuning capacitors of this model. Good luck with your model 40! If you have any questions regarding this article, feel free to call or write me for clarification. Jim Cirner, 13366 Pastel Lane, Mtn. View, Ca., 94040, phone: (415) 967-7672.



The capacitors after removal from the power supply can

RESTORATION HINTS

REPAIRING MAGNETIC CONE SPEAKERS

BY JIM CIRNER

Prior to 1927, most speakers were of the "magnetic" type as opposed to the now used "voice coil" types. The method of repairing these old magnetic speakers is becoming a lost art. However, assuming that the magnet coils are good, you may proceed with the following information.

For repair of crushed or torn cones such as the Crosley Music Cone speaker, remove cone from speaker. If cone is crushed, dampen with water until paper is pliable and iron it. Set iron temeprature control at low heat and iron cone to proper shape on the underside until dry. Don't iron a dry cone or you might scortth or burn it. Glue, sparingly, small tears with G. C. speaker cement on underside of cone. If tears are large it might be necessary to glue a patch to the underside of tears. I use blotter paper for patching material.

Some speakers' motor mechanism parts are made of pot metal and often are cracked or totally broken. I remove all pot metal parts and coat the entire part with 12 to 24 hour-setting-up-time, gray or clear epoxy. If entirely broken I glue broken sections together with 5 minute-setting-up-time epoxy and use the 12 to 24 hour type to fill all the tiny cracks in the pot metal parts. After the epoxy is dry I file excess epoxy off of parts and file parts into proper shape.

If you have to remove the permanent magnet from the motor assembly, put a nail across the magnet to help hold magnetic field. Since I don't have any pictures of the internal structure of the Music Cone speaker, I am going to use a Model 100A drawing out of my RCA service manual. The pictures illustrated in this article are basically how most magnetic cone speakers are made. In the case of the Music Cone, the cone is inverted, that is, the center protrudes toward the listener.

Make sure when you replace the cone that it is properly seated and not applying torque or twist on drive rod (Fig. 1). Also, make sure there are no foreign materials interfacing with armature

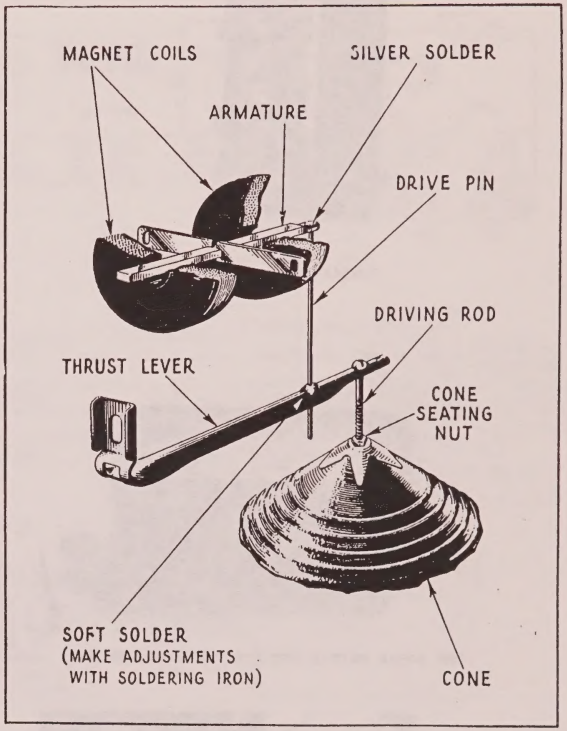


FIGURE 1. Construction details and operating principle of RCA Loudspeaker 100A

FIGURE 2. Armature bracket adjusting screws A and B

action. I use an air compressor to remove dirt, etc. You can substitute for the tools shown in Figure 3 by using standard speaker shims. They work equally as well.

GENERAL INSTRUCTIONS FOR ADJUSTING ARMATURE STRIKING POLE PIECES:
(Procedure may vary a little in different kinds of speakers)

Distortion and rattle may be caused by the armature striking either or both of the pole pieces of the permanent magnet. This is generally determined by inspection, though in some cases the contact may be so slight that it may be necessary to adjust the armature to check on this condition. In any case an adjustment of the armature is necessary.

To adjust the armature, a set of spacer tools is necessary. Figure 3 illustrates the general appearance and correct dimensions of these spacer tools. The stock, obtainable on the open market, should be a phosphorous bronze strip .010" thick and .25" wide. It is bent as illustrated and soldered to hold the opening fairly rigid. The two ends are tapered as illustrated to a .15" width at their extremities.

Two of these tools are necessary when adjusting the armature. Place one tool in the space between the armature and pole piece of the motor mechanism at the end next to the filter unit (Fig 2). The other tool is placed at the other end of the armature a little to one side in order to clear the drive pin located at this end of the armature. By loosening screw A and B (Fig. 2) any tension in either direction which may have been on the armature is released and the spacer tools will provide the correct clearance or spacing. While the spacer tools are in place a hot soldering iron is applied to the drive pin thrust lever, connection point C (Fig. 1), and the solder heated sufficiently to allow the drive pin to find its normal position with regard to the thrust lever. The iron is now removed. Screws A and B (Fig. 2) are tightened and the spacer tools removed. The armature is now correctly aligned and balanced so that no abnormal strain is being imposed upon it in any direction.

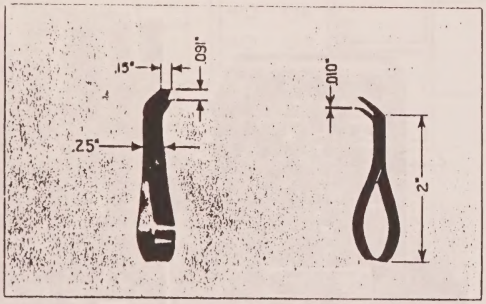


FIGURE 3

General appearance and dimensions of armature spacing tools.

PLAYING OLD LOUDSPEAKERS

Do you have an old horn or large-cone armature-type speaker that you would like to hear playing? Try this: take a transistor radio with a plug-in earphone. Cut off the earphone. Connect the wires from the earphone to the secondary wires of an output transformer (these wires originally went to the speaker). Connect the primary wires of the output transformer to the speaker (the primary wires originally went to the radio chassis). The output transformer is necessary to match the transistor radio to the impedance of the old loudspeaker (usually about 2000 ohms).

Plug in the earphone and turn on the transistor radio. If the speaker is good, it will play. This set-up also makes a good testing device for old speakers. Output transformers are readily obtained from junk sets, especially AC-DC table radios. A small filament transformer will also probably work.

- - -

A replacement cone for the old magnetic armature speakers can be made easily. Obtain a sheet of stiff, light paper. With a drawing compass (available at any 5-and10¢ or stationery store) draw a large circle. Draw a line from the center of the circle to the edge. Cut out the circle and cut along the line to the center. Overlap the edges to make a cone that will fit on the speaker. Hold the edges with a paper clip and glue the seam. Color the paper with wood stain to make it look old.

RESTORATION HINTS

RESTORING THE MAJESTIC "B" ELIMINATOR

By Allan Bryant

In this article I will discuss the restoration of the Majestic "B" Eliminator. Specifically the Standard and Supor models.

These eliminators employ a fullwave, gastype, cold cathode rectifier - a BH tube. Three voltage taps and a ground are provided at the output of the supply. In addition, the primary of the power transformer is tapped, providing two voltage ranges which are selected by the "Hi-Low" switch on the front panel. The voltage outputs are controlled by the setting of two carbon compression type pots.

To begin the project, lift off the top of the case and remove the BH tube. Pull the tube straight up and out of its socket. Test the tube. The BH tube is normally good for about 4000 hours service. After that the voltage output will drop off. Flip the unit over and remove the four screws holding the rear half of the case. Loosen the two screws holding the front panel. The front panel and case join to form a "track". The case should now slide upwards riding in that "track". A screwdriver is usually necessary to get things moving. Note that the bottom edge of the case has a lip on it that tends to catch the internal wires as the case is lifted off. Another way to remove the case, is to press in at the joint of the front panel and case on the right hand side so as to disengage the track. Then bend the right side out enough to clear the wires and ride the case upon the left hand track.

With the case off, make a continuity check of the chokes, transformer, and pots. The detector resistor is a high failure item, it should measure 7,000 ohms. Its failure symptom is a high detector voltage.

Now we come down to the most common failure - shorted capacitors. As most collectors know, you just cannot trust these old capacitors. Even if the unit is presently running, it should be recapped. The capacitor values, shown on the condenser bank diagram are original. You can save space and money by converting to the values shown on the schematic. However, there is a lot of space available in the can, so you might just want to use what you have on hand. The values of the filter capacitors are not critical, but to remain within the desired voltage range, do not exceed 5 MFD. Voltage values are 450 volts, except for the two capacitors across the transformer secondary. These are used to prevent oscillation across the rectifier tube, and should be rated at 600 v.

All the capacitors are contained in one tin box. To avoid confusion, I suggest marking the terminal numbers shown on the schematic, directly onto the unit. A grease pen works excellent for this purpose. Remove and label all wires soldered to the capacitor box. Then remove the two screws that are holding the front panel in place, and move it as far out of the way as the wires will permit. The capacitor box and all other boxes in this unit, are held between two metal plates which are riveted to the base of the unit. Several long bolts pass through these plates and hold the boxes in place. Remove all these bolts, then clip off the ground wire on the rear of the capacitor box. Next slip the tube socket and its mounting plate forward and free of the unit. The capacitor box can now be slid forward between the rails and removed.

We can now replace the capacitors. Begin by bending the lip on the box outward, so that the cardboard panel can be removed. Pry the panel out of the box and cut all internal wires leading to it. Take the panel and clean it up, then attach the new capacitors to it being sure to observe polarities and avoid shorts. Next, we have to get the old capacitors out of the can so we can re-use it. The safest way to do this is with a heat gun. I have found that a gun with a 300 degree output works well. To set it up, stand the capacitor box on end and direct the gun at it. In a short time, the tar will run out, and when you invert the box tar capacitor pack will slip out.

When the above is finished, you are ready to reinsert the capacitors. First put some foam rubber in the bottom of the can to help support the capacitors. Next slip the cardboard panel back into place and bend the metal edges down to secure it. Put the box back in position between the rails then reposition the bolts that hold the metal plates together.

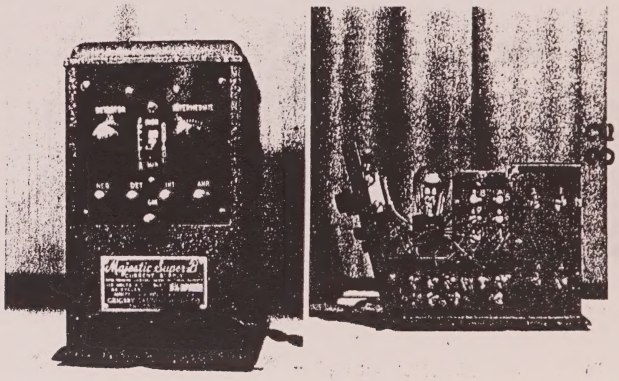
Now is a good time to inspect the condition of the wires in the unit. Replace any that are bare, or have cracked insulation. Resolder the wires leading to the capacitor box. You may also want to install a fuse in the primary circuit at this time. Remember to make it accessible from the top cover. The front panel and case can now be reassembled. Reverse the process you used to take them off. Be careful not to snag any wires, when putting the case on, or mash any wires under the edge, when tightening it down. Place the BH tube in its socket.

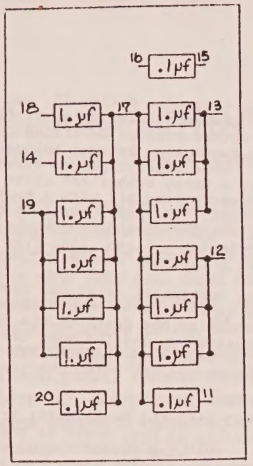
Turn the unit on and measure the output voltage in the low range without a load. You should see these approximate voltages (adjust pots for maximum reading) Det = 70 v max, Int = 180 v max, Amp = 250 v max. Note that the amplifier voltage, varies inversely with the detector value. If you have no output and your unit uses circular shaped pots (vs. oval), look for a short between the pot case and front panel. If you find one, a little electrical tape will clear it up.

When using this and other eliminators remember to always turn on the filaments before applying B/, and always turn off the B/ before powering down the filaments.

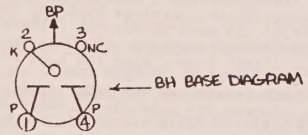
Good Luck.

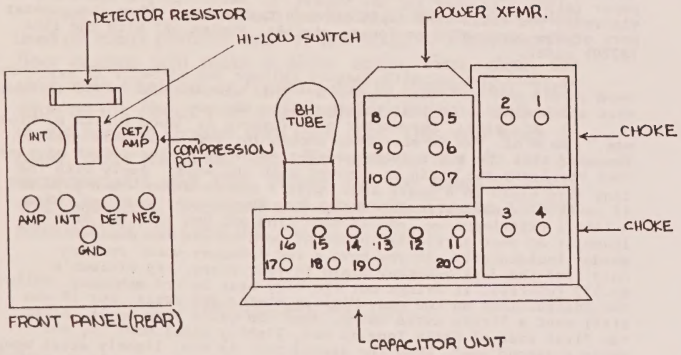
Allan Bryant, 4251 Blewett Street, Fremont, Calif. 94538
651-1458



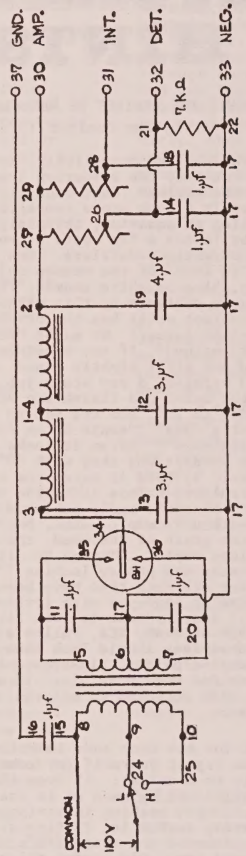


CONDENSER BANK
(INTERNAL)





ELIMINATOR COMPONENT LAYOUT



MAJESTIC STANDARD, SUPER, "B" ELIMINATOR

RESTORATION HINTS

Should the Cabinet be Refinished?

By Sue Coulter

Your antique radio plays beautifully, and naturally it should look beautiful too. Put away the soldering iron and the VOM and take a good look at the cabinet. What condition is it in now? If you found the cabinet in a junk store converted to a bookcase, hamster cage or housing an aquarium, obviously it needs some restoration. No doubt it has a few coats of enamel. Enamel paint is the favorite weapon of antique defilers. One way to spot an antique in a junk store, is to look for the wooden object having the most coats of pink, green, blue or white enamel. The author has found three beautiful console cabinets by this method alone.

Suppose your cabinet still has the original finish or the original plus some clear laquer? Or maybe the actual wood is scratched, burned, split or unglued? If so, consider refinishing it. If the wood is unmarred and still tightly glued, maybe just a simple stripping off of old varnish, a new stain job and some finish will be sufficient. If the color and finish are still presentable, should you do anything to it? Who are you to try to improve on the original manufacturer's idea? People bring furniture to an antique shop to have it "refinished". Often it looks beautiful when they bring it in, and one wonders why they wish to alter it. Two common customer requests are: 1)"Make it match the other furniture in the room." This is ridiculous, unless it is the same type of wood as the other furniture. Most old radio cabinets are walnut or mahogany and can be stained with oak, maple, etc., but their beauty is lost. Anyone can tell by the grain of the wood, that they are not "golden oak" or "Early American maple". Trying to alter them will only make them outstandingly tacky and phoney looking. They will be only one step above the vintage cabinets that have been gutted and then filled with digital clock radios, sprayed with irridescent paint and put in the young moderns' den. 2)"Make it look like new again." New as of when? Like in 1930 when AK, RCA, Philco et al made it? Or new as in 1978? A restored antique should look like it did on the day it left the factory. Acrylic paints, plastics, modern components and wiring are to be avoided when possible. If any of these must be used, then disguise them, hide them and do all that is possible to achieve the original appearance.

Once the decision has been made to refinish the cabinet, another must be made; do you try it yourself, or take it to a commercial shop? Here are some points to consider: 1) Does the commercial shop strip the old finish material off by hand or is the item soaked in vats of paint stripper? Prolonged soaking in stripper loosens the joints and may even completely unglue it. 2) Discuss the type of finish you want. If possible, furnish the shop with a photo of how this model set looked when it was new. Old wooden objects, including your radio, should glow with the soft patina of mellowed wood- not shine like wet glass, after being "shot" with high gloss vinyl lacquer. 3) What about the logo, will it be removed? Paint stripper most certainly will remove it. It is usually possible, (but tedious), to dry sand around a logo and leave it intact. However, few commercial shops will make the effort. 4) Always remove the works, speaker, grill cloth. glass dial and knobs before entrusting your set to anyone who is not a radio expert.

So you decide to do it yourself! First of all, you will need a well ventilated area, temperature below 90°F.,and free of vegetation, pets, kids and other wild animals that would be harmed by contact with paint stripper. Live in a city apartment? Then how about putting 15 to 20 layers of old newspaper on the concrete drive, place a metal garbage can on this, a wire rack across top of garbage can and put your cabinet on the wire rack.

Materials:

For a cabinet the size of a Philco 70, you will need one pint of stripper, if the old material is varnish. If it is enamel, probably three pints. The author prefers Certified Chemicals F-33 stripper. You will need at least a quart of lacquer thinner. You will also need gloves for your hands. Some plastic gloves dissolve on contact with these materials, so try a heavy rubberized glove with fabric lining, such as Playtex. Also equip yourself with a heavy paint brush and a small stiff bristled brush. The small brush should not be wire. A denture brush is excellent for scrubbing our the carved areas, because it has two shapes of bristles. Clean, lint-free rags, fine steel wool and if the wood is scratched, some #150 and #220 sand paper are also needed.

After trying many commercial paint and varnish strippers, the author prefers F-33, because it will remove enamel, as well as lighter varnishes. It does not raise the grain of the wood, therefore, sanding is not usually necessary unless the wood has been scratched. It can be rinsed out of the wood with lacquer thinner. It acts rapidly, so glued joints are not exposed to harsh chemicals for long periods of time.

Procedure:

1) Apply the F-33 with the heavy paint brush. If the cabinet is large or the temperature is hot, begin at the top and do only one square foot at a time. The time period for leaving F-33 on the wood, depends on the type of paint varnish being removed. Leave it on until the old material crinkles and forms a wrinkled skin. Remove this skin with a rag soaked in lacquer thinner. Remove the majority of the old finish in this manner. Once you've gone over the cabinet and removed the majority of the paint, concentrate on the crevices and carvings. Dip the small brush in F-33 and scrub the material out of the stubborn areas. When all of the old material has been removed, scrub out the carvings with the small brush and lacquer thinner. Allow the wood to dry.

2) If gluing is needed, glue the joints, loose veneer, etc. Let it dry a little longer than the time recommended by the glue manufacturer's instructions.

3) Burns, scratches and other disfigurations can now be removed by sanding. Excess dry glue can be removed with sand paper or a very sharp knife blade. Always scrape and sand with the grain of the wood, never across it. For deep scratches etc., begin with the heavier paper (#150). If your set has veneer, go easy. If you are too vigorous, you could sand right through the veneer. When the greater part of the scratch is no longer visible. Finish off with the fine (#220) paper.

4) Wash the set with lacquer thinner and allow it to dry. The wood should now feel satiny smooth. This wash should remove the dust, dirt and perspiration that resulted from the sanding.

5) Staining: The author's preference is "Wood Finish by Miniwax." An 8 oz. can is more than enough for even a console cabinet. Remember that the exact shade you get, depends on the length of time that you leave the stain in contact with the wood. Apply with the lint free cloth to a small area, wait a minute or so, then wipe off. If you wish a darker shade, apply more stain, wait and wipe. With a little experimenting, you'll soon find out how long you must leave it on your particular piece of wood to get the desired shade. Incidentally, if you have a red mahogany wood, and can only find the dark mahogany stain in your store, try Miniwax's No.235 (cherry). It brings out the very best in red mahogany. Follow the instructions on the can. Miniwax stains and seals, but if you still want a little extra shine, hand rub Satin Tone on it. After the first coat of Satin Tone is dry, lightly steel wool it, and apply a second coat. When the second coat is dry, lightly steel wool again, and then give it a good rubbing with furniture polish, like Pledge Lemon Oil.

Good luck! You've just saved yourself about forty bucks! May your thing of beauty be a joy forever.

RESTORATIONHINTS

Helpful tips from CHRS members

A quick way to replace capacitors and resistors in most sets can be accomplished in the following way: Cut out the old part by clipping the leads very close to the part itself. Take the leads on the new part and wind them around a piece of stiff wire, precision screwdriver, or test lead in the form of a tightly coiled spiral spring. The coil can then be slipped over the remaining portion of the original leads and easily soldered into place. This is much easier than struggling to unsolder the component form its original solder point, and often makes it easier to replace if it is located under other components and wires.

Formby's Furniture Face Lift kit can often rejuvenate the original finish on most sets if the finish has dulled but is still intact and not alligatored. The rejuvenated finish can either be glossy or satin as the user desires. This often saves the time and trouble of complete refinishing.

Another excellent product for restoring the original beauty and depth to a wood finish without refinishing is *Howard's Restor-A-Finish.* When applied and rubbed with 0000 steel wool, the product cleans, removes scratches, water marks, white rings, etc. Several colors are available, depending on the shade of wood that you're working with.

Ever wonder how restore the lustre to the airplane cloth used on many portable sets? A few coats of *Future* acrylic floor coating will make it shine again. First, clean the cloth with *Fantastik or Formula 409* to remove dirt. Then wipe on the *Future* with a cloth and let it dry. It will soak in and become glossier with each coat. This will work on many other surfaces, too. Be sure to try it on an inconspicuous spot first. Future may be removed easily with household detergent and ammonia. Thanks, George Murdock for this great tip!

Restoration Hints

Brown Cloth Line Cords

If brown cloth-covered line cord is not readily available, one can make a satisfactory substitute by dyeing the gold or white modern cloth cord with a dark-colored wood stain.

--H. Brams

Intermittent Wire-Wound Resisters

Many intermittent problems in radios arise from defective cloth or metal-covered wire-wound resisters which open up when they become warm. Replace these as necessary.

--H. Brams

Rattling Speakers

Buzzing or rattling noises in speakers may arise from material that has become trapped between the rim of the cone and the frame of the speaker at the rear of the cone.

--H. Brams

Hum Problems

If a power transformer is replaced in a set, the sound may sometimes become garbled or a hum be heard. Bypassing the 117 V AC primary leads to ground through 0.01 mfd 600 V capacitors will often eliminate this problem. Also, shielding the lead from the volume control to the first audio tube reduces hum in many sets.

--H. Brams

Replacing Parts in Philco Radios

Restoration of Philco radios is generally tedious because the capacitors are mounted inside small Bakelite blocks. Removing these blocks leaves holes in the chassis which spoils the appearance of the set. The following procedure allows one to clean up the wiring to a considerable degree without changing the outside appearance of the set. Cut off the tubular part of the capacitor block through which the screw goes and use these as spacers for mounting terminal strips. Pass the original screw through the strip, then through a lockwasher and then the spacer. Then mount the assembly in the original hole.

--H. Brams

Rubber-Covered Drive Wheels

The rubber rims of drive wheels can often be replaced by belts or O-rings. There are various sources for these, such as plumbing supplies, tape recorder parts, auto stores, sewing and vacuum repair shops, etc. A good source of O-rings is the R. W. Scott Co., 2345 Fourth St., Berkeley, CA 94710. One should lift the O-ring onto the rim of a wheel rather than rolling it on. Otherwise, it may have a tendency to roll off under use.

--H. Brams

Loose Tube Bases

Loose tube bases may easily be re-attached to the glass bulb with the new instant crazy glues. The glue sets quickly and no unsightly glue lines remain.

--H. Brams

Cutting Screws

When a screw must be cut to a certain size, first put a nut on it. After cutting the screw, make the cut end slightly pointed with a metal file, then remove the nut. The screw will now easily enter its appropriate hole.

--H. Brams

On Restoration

by Dave Brodie

A Timely Reprint from an Editorial in the September 1978 Bulletin of the British Vintage Wireless Society.

Restoring and researching a piece of equipment alone can be no easy matter and all collectors are reminded that the third aim of the Society is preservation not renovation. This does not mean that renovation or restoration is a bad thing. Our emphasis is on preservation, and we consider that this must take precedent in all cases. Time and again, important equipment has been ruined by the enthusiasm of the do-it-yourself restorer -- and not only in the wireless line! If you have what appears to be a unique item, it is all the more important that you postpone restoration until all the facts are known. Even if your item is not unique, you may get great personal pleasure from "working on it," but try to remember posterity! If in fact the BVWS does not constitute a "museum" of a distributed kind, then we should try to adopt the attitudes of a good museum keeper -- we should look after things and find out what we can about them before passing them on to the next generation. We don't want to pass on a lot of well polished "fakes," or find ourselves in the embarrassing position of fellow collectors showing no interest in our prize exhibits simply because they are over-restored. The exhibition at the Victoria & Albert Museum last year showed that BVWS collectors on the whole are well aware of these principles.

In further correspondence with the Editor of the BVWS, he aptly stated: "The first exciting days of collecting and restoring for new members seem to be really quite destructive! Surfaces are scraped and revarnished with all sorts of modern polyurethane materials, etc. -- but in time collectors see the mistake of doing this and begin adopting the conservationist's approach."

CHRS adds its "Amen" to the above.

RADIOLA 20 (cont'd.)

MECHANICAL CONSTRUCTION OF CHASSIS AND PARTS: The chassis and parts layout is orderly and well thought out. The three gang, straight line frequency condensers are separated enough to add in the reduction of RF coupling between the RF stages (fig. 2). The structural aspects of the chassis, mounting flanges, coil mounts, tube mounts, etc. are rigidly designed and mechanically sound. The tickler controlled regeneration wheel is uniquely designed to roll the tickler coil smoothly and effectively into and out of the coupling coil's magnetic field (fig. 3). The set is extremely well built mechanically.

This is the last issue in which the "Cats Whisker" book will be offered. This means that if you plan to take advantage of our special reduced rates, your order must be received by March 1, 1979. A few copies will be available at our future swap meets, on a "while supply lasts" basis. The club will continue to offer books on related subjects, when they become available.

TECHNICAL SPOT

fig. 2

Small Grid Bias Cells

by Allan Bryant

Many receivers of the 1930's employed Duo-diode triodes with high mu factors, such as the 75 and 2A6. These were used as a combination second detector, AVC and first audio. The triode requires a low negative bias and has a low plate current. Furthermore the contact potential at the grid is unusually high for a new tube (about +.9V), gradually decreasing with age. Contact potential is defined as that point where positive grid current starts to flow (fig. 1). Contact potential is caused by the initial velocity of emission of electrons from the cathode and an electro-thermal effect due to the differences in temperature and in material composition of the grid and the cathode.

fig. 1

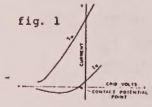
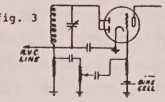


fig. 3



This introduces two difficulties. First, these tubes should operate at -2 volts C bias. If the bias is originally set at -3 volts to overcome the contact potential of +.9 volts, eventually the tube will be over-biased. If the bias is produced automatically by a cathode resistance, the latter would have unusually high resistance for an audio tube. Unless extremely high capacity shunt condenser, which are expensive, are used, considerable AF degeneration (loss of signal strength) will occur. Much of this difficulty is eliminated by the Mallory grid bias cell, shown in fig. 2. This cell is acorn shaped, about 5/8" in diameter and 11/32" deep. It is an electrolytic cell which originally has a no-current potential of 1 volt, and if charged by a current will have a potential not exceeding 2 volts. It holds its charged potential for about 48 hours, gradually dropping to normal.

A typical circuit to overcome the effects of degeneration and varying contact potential is shown in fig. 3. For a new tube, the cell which is in the grid circuit with a grid resistor, cancels all the + contact potential, leaving a net C bias of about -.1 volt. On a strong signal, grid current flows momentarily, charges the cell to -2 volts, and the net bias is -2+ (+.9) = -1.1 volts. As long as the signal does not exceed this value, normal action takes place. Momentary excessive grid signal only recharges the cell. As the tube ages, its contact potential drops and more of the cell voltages are usable. Thus with aging of the tube, it will handle stronger signals. Inasmuch as the cathode C bias resistor is no longer used, degeneration is obviously eliminated as a problem.

These cells were said to have an unlimited life, and the cost of the cell more than balanced the need of cathode bias by-pass condensers. You will find these cells employed in many Stromberg Carlson and later model Spartan receivers.

The problem we collectors encounter today, is what to do with the old cells. If your set has the cell intact, measure its potential with a voltmeter. Most likely it will be dead. Jim Cirner and I have had good luck in rejuvenating dead cells, by letting them soak in rubbing alcohol for a few minutes. This procedure will rejuvenate most cells to approximately 1.2 volts. If this method doesn't work, or if you're missing the cell, try replacing it with an AA cell (1.5 volts). Be sure to observe proper polarity when wiring it into the set.

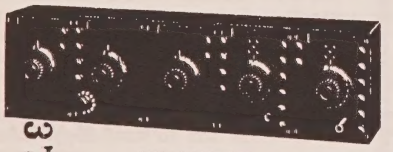
Parts of the preceding article were taken from "National Radio News", February/March, 1936.

(Easy way) Remove screw holding bakelite block capacitor down on chassis. Turn block over, this exposes the tared in capacitor. The leads are usually long enough to allow you to turn capacitor over without breaking anything. Occasionally it will be necessary to unsolder a wire or so in order to turn over a block capacitor. By not removing capacitor block from the set this saves a lot of time. Hold block firmly and take a medium size screwdriver and dig out as much of the tar from the top and sides of the capacitor as you can and use a larger screwdriver to pry capacitor out of block.
Pry from screw-down end of block. The other end and side are too thin and can be cracked while prying. I also have a small screwdriver which I modified by bending the tip to a 90 degree angle to aid prying out old capacitors. A little additional scraping will completely clean out block. It takes me three to four minutes per capacitor.
(Caution note) On several of the early chassis, 1928, 1929 and 1930 consoles there was some cathode bypass block capacitors that had cathode return wire wound flat resistors also potted in the block. Model 29 and 30 are an example of these sets. A little more care has to be taken to avoid damaging these resistors.

(Recommended capacitor to use in the blocks)
Sprague Defilm Orange Drop dipped tubulars 400 v series fit in the blocks well. The 600 v series are too large. They are available in almost any value you would need for radio work. The typical Sprague catalog numbers for capacitors are example: .01 MFD 400 v, 4PS-S10, .05 MFD 400 v, 4PS350. Catalog C-620, page 20 has the complete list. Quantity discounts are available when ordering 50 or more. Also, mixed combination orders are OK. If a group of collectors are having trouble in their area getting capacitors and electrolytics, let me know and I can buy a large order and save us all some money. Theoretically, after going through my restoring procedure when you turn your set on it should work, maybe requiring alignment. Of course, being human once in awhile we make a mistake and it will require a little friendly trouble-shooting.

I hope this article will help you in your future restoration projects.
Jim Cirner, 13366 Pastel Ln., Mt. View, CA. 94040.

Service Radio Equipment



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Restoration Hints

by Wm. Herbert Brams

Cleaning Radio Cabinets

I have found that a product called plastic steel wool substitute, used often in dishpan scouring pads, is excellent for cleaning dirt and grime from radio cabinets. It is soft enough so that it doesn't scratch the finish, but it does not crumble away with hard scrubbing.

Staining Light-Colored Wood

When trying to darken light-colored wood, I have found that conventional stains often give an unpleasant "Zebra" effect - very light areas contrasting with very dark ones. Instead, try applying ordinary brown paint, slightly thinned, and wiped off carefully. This gives a more uniform coloring. Also, I paint the edges of cabinets with exposed grain a dark brown. This eliminates the raw look of such areas and gives the cabinet a more "Finished" appearance.

Loose Knobs

If a slide-on fits loosely on a shaft, coat the shaft with plastic glue and allow to dry. The increased diameter makes the Knob fit better.

Fixing Broken Set-Screw Knobs

If a set-screw knob has been broken by over-tightening, put the pieces together in position and hold the knob together with a rubber band. Then fill the underside of the knob with epoxy glue and allow to harden. This gives a much stronger bond than just gluing the pieces together.

Stringing Dial Cord

When replacing dial cord, tie one end of the new cord to the tension spring. Pass the free end of the cord through the hole or slot in the rim of the wheel on the tuning capacitor and pull the cord so that the spring is against the inside of the rim. Proceed to string the rest of the set. Pass the end of the cord back through the rim hole and tie the cord to the spring. Stretch the spring and attach the free end to the appropriate mounting hole on the wheel. If the cord is too slack, twist the spring several times to shorten the cord before attaching the free end.

Preventing Dial Cord Slipping

To prevent dial cord from slipping on tuning shafts, swab the string with a solution of rosin (available from music stores) dissolve in alcohol.

Starting Nuts

To start a nut on a screw in an inaccessible location, hold the screw, then take a wood pencil, press the eraser end on the nut, and turn until the nut catches on the threads.

Planetary Vernier Drives

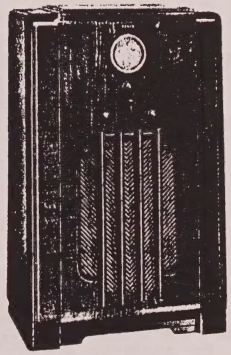
If a planetary vernier drive is slipping and can't be fixed by lubrication or by tightening the screws, spray the mechanism with degreaser to remove the grease inside. Often the increase friction will allow it to operate normally.

RESTORATION HINTS

PROCEDURE FOR RESTORING ANY PHILCO RADIO USING BAKELITE BLOCK CAPACITORS

By Jim Cirner

For the purpose of this article I used a Philco model 37-670. This model has 7 bakelite block capacitors, plus conventional tubular capacitors. From experience I have found in order to make any old radio reliable, it is necessary to totally recap the set with new style capacitors. Don't use new old stock paper capacitors with the waxed-in ends. They're unreliable. I have observed that many collectors when rebuilding a Philco cut the terminals loose on the bakelite block capacitors. Of course, this leaves a lot of new tubular capacitors and wires floating free. This makes for a very messy restoration, and the underside of the chassis has a butchered look.



Starting Complete Restoration

Step 1: Clean chassis thoroughly and clean dirt out of tuning capacitors. Wash plates with ethel alcohol. Alcohol detunes tuning capacitor. If you are in a hurry to operate the radio, use a heatgun to evaporate alcohol out of the tuning capacitors. Check to make sure plates are not touching.

Step 2: Check resistance of pots and clean with a good quality contact cleaner. The best I have found is called No Noise Volume Control Contact Restorer. It is manufactured by Electronic Chemical Corp., 813 Communipaw Ave., Jersey City, N. J., 07304. Also, clean band switches and toggle switches, etc.

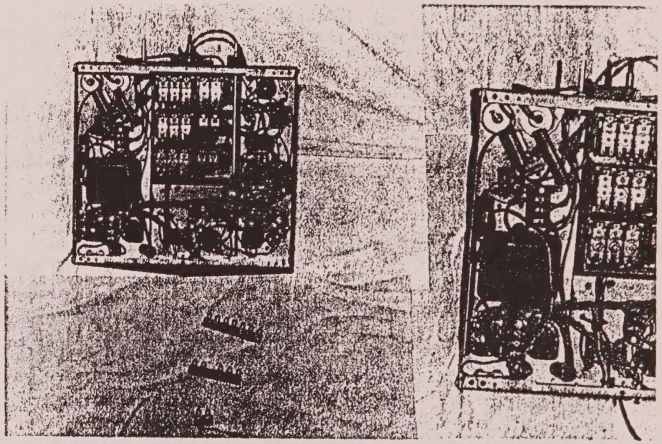
Step 3: Make an ohm meter check of transformers. IF's, osc. coil, interstage, power, speaker output and power supply choke.

Step 4: Ohm meter check every resistor. Usually you will find at least two resistors as much as 50% or more out of tolerance and once in awhile an open one. Resistors 20-30% out of tolerance generally don't make much difference except in osc. circuits.

Step 5: Replace line cord if required. I suggest you install a fuse in the primary circuit of the power transformer.

Step 6: Now starts the fun. (Replacing electrolytic capacitors) I don't remove can types that are visable on top of the chassis. This leaves unsightyly holes which look bad.

Var.1: (Capacitors that have one stud which is the positive terminal.) Disconnect the wires from positive stud. Take a conventional terminal strip (as shown in the pictures of this article.) If it has too many contacts cut the extra off. Leave one solder terminal chassis and screw down terminal. Split the chassis screw-down ring and slip it over the positive stud of the old electrolytic. Solder the terminal strip to the positive stud. This gives you a solid mount for all the loose wires and an easy way to mount a new tubular electrolytic in its place.



Var.2: (Multi-lead electrolytics) Mount a terminal strip close to the old electrolytic and transfer all the wires. Sometime you can follow electrolytic wires to their origin and remove wires and solder a tubular capacitor at that point. In the case of multi-stud electrolytic capacitors, mount a terminal strip with the correct amount of terminals required on one of the studs like in Var. 1.

Var.3: (Tubular electrolytics) They require no special procedures.

Step 7: (Bakelite block capacitors) There are several ways to replace the inside of these bakelite block capacitors.
(Difficult way) Remove block from set and melt tar and capacitor out with a heatgun or melt out on a hotplate or inside an oven.

Restoration Hints

by Herb Brams

Your AC Set Doesn't Light Up?

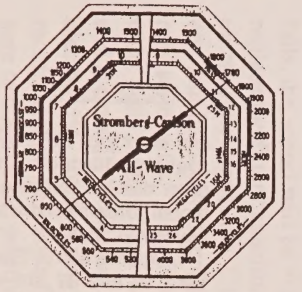
You plug in your old set and turn it on. It does not play. The tubes don't even light up. Do you think the power transformer is bad? Before you go through the trouble of replacing it, consider these alternatives: (1) the On-Off switch may be bad. (2) there may be a break in the line cord wire. (3) the plug may not be making electrical contact in your AC outlet. (4) the fuse may be open not making contact with its holder.

Slipping RCA Dial

A 1935 RCA floor model radio with a 4 in. round dial had a tuning knob that could be pulled out for fine tuning or pushed in for fast tuning. The dial drive was a planetary unit with three flat metal fingers that gripped a toothed gear for fast tuning. The fingers were pulled out of contact with the gear by the tuning knob for fine tuning. The gear teeth had become worn so that when the knob was pushed in, there was insufficient grip to provide the fast tuning and the knob slipped instead. Bending the fingers inward did not help much but the problem was solved by slipping a tight-fitting rubber O-ring around the metal fingers.

Replacing Speakers

If one has a dead speaker in a set that cannot be repaired and one wants to preserve the original appearance of the set, mount a new, smaller speaker in front of the old one. The new speaker will be hidden by the old one and the original appearance of the set will be preserved.



SELECTORLITE DIAL

The dial is divided into four sections: 540 to 1500 Kc, the standard broadcast channels; 1500 to 4000 Kc, the police, aircraft and amateur channels; 4000 to 10,000 Kc, including the 49 and 31 meter broadcast bands; 10,000 to 25,000 Kc, including the 25, 19 and 16 meter broadcast bands and down to 12 meters. Only the section in which you are tuning is illuminated.

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Radio Reproducer
ANOTHER
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"Several times I have intended to write you or call you when visiting Newark. I wanted to let you know of the fine service we have been getting from the Mozart Baby Grand. The clearness of music, voice and other entertainment seems so different from other loud speakers that we have experienced. We also use the ——— Talkers, but we stick to the Baby Grand for Accuracy."
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Baby Grand Reproducer, with gold plated unit, black and gold crackle or extra heavy coated all black satin finish taupinox, 12 inch bell) $12.00
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Starting Nuts

To hold a nut in that impossible place while you get the screw started, try this trick: cut an appropriate lenght of solder (large diameter works best) and lay one end across the nut on a hard surface. Hammer this end sufficiently to flatten the solder and drive a lump into the nut threads. The solder can then be bent and the nut will stay attached while it is positioned over the screw, using the solder as a handle. The screw can then be started into the nut.

Dial Glass

For broken round radio dial covers, try glass clock faces. These are usually available at clock repair shops.

Speaker Cloth

Fabrics used for speaker grill cloth may be stiffened with spray starch or spray paint.

Volume Control

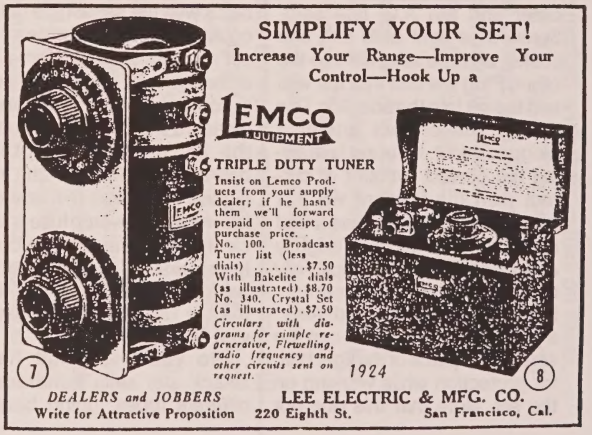
For smoother control of volume in radios that use a potentiometer as a variable resistor in the cathode of the RF tube, connect a 100K one-watt resistor from B+ to the cathode of the tube.

Philco Pushbutton Radios

Philco radios of the late 1930's that have pushbuttons have two large wax-coated ceramic 370 pfd mica capacitors on the pushbutton assembly. These are often bad, making the pushbuttons inoperative. Replace them with good micas.

Neon Tuning Indicator Tubes

Neon tubes used as tuning indicators can sometimes be restored by filling them with new gas. Sign manufacturing companies may be able to provide this service.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** RESTORATION HINTS **

Helpful tips from CHRS Members

If your mineral crystals seemed to have lost their sensitivity, it may be due to oxide formation on the outside surface. Try buffing them with 0000 steel wool.

Sometimes when an old component or insulation fails in an old set, the set starts to draw large amounts of current which can ruin other components or the entire set, blow fuses and start fires. One way to protect your set (and house) that is quite inexpensive is to make a circuit protector. Buy two porcelain light sockets (the type for ceiling mounting) one 200 watt light bulb and one adaptor that allows you plug a standard A.C. cord into a light socket. Mount the light sockets on a board and wire them IN SERIES with each other and the A.C. line cord. Screw thee light bulb into one socket and the adaptor into the other. Plug the unit into the wall and the set into the adaptor. This device will protect anything plugged into it. If the set is drawing the correct amount of current then the filament will just barely glow. If the set has a bad short the lamp will glow brightly or incandesce. It is especially useful when the power transformer primary is shorted. Also, a low amperage fuse can be screwed in place of the light bulb for protection while working on the set. Note that this doe not take the place of an isolation transformer and will not protect the repairman from electrical shock. It is just cheap insurance for your set.

Speaking of cheap insurance, how many of us have had radios which were playing fine, suddenly develop a problem and burn up before it could be shut off? Of course, one way to protect the set is to replace all of the filter and paper condensers as they are usually the causes of the problem. Another important thing to do is to put a fuse on the A.C. line of every A.C. powered radio. A one-ampere capsule fuse similar to the ones used in automobiles put into an inline fuse holder on the power cord will prevent alot of damage. Alternately a fuse block with the same type of fuse could be mounted inside of the set's chassis to preserve the authenticity of an antique cord. If you have an A.C. ammeter, measure the amount of current the set uses during proper operation and install the next highest value fuse. In many sets, however, a one-amp fuse is sufficient. Saving the cost of a power transformer (if indeed one can be found) will make the time, trouble, and minimal expense well worth your while.

Do you know that Radio Shack still sells hundreds of different tubes, going back to and including '01A's? They are available through their mail order division and take about a month. Orders can be placed at any Radio Shack.

... Hints, cont'd.

Megular's Mirror Glaze numbers 10 and 17 are excellent cleaners and polishes for all types and varietles of plastic or Bakelite; often making them look like new. Scott's' Liquid Gold if often good for cleaning and shining painted metal surfaces such as those found on manufacturer's plates and early horn or cone speakers. Be sure to try some on an inconspicuous area first.

Need to tuck a component under a chassis? Glue from a hot - melt glue gun will attach almost any parts to the underside of a chassis; even transformers. No holes have to be drilled or punched and it is completely hard in ninety seconds.

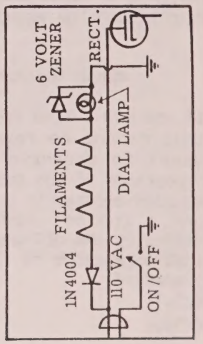
Fabric shops specializing in Oriental Silk often have very nice material suitable for grille cloths.

Keep in mind that voltages given in early service documents (Rider's, etc.) were based on meters with sensitivity of one or two hundred thousand ohms per volt. Many of the meters now available have twenty thousand ohms per volt or greater. They do not load the circuit as much as the old meters, so readings may differ from that stated values. Try using an old meter sometime, one that is about the same age as the set you're working on. You may be surprised. In fact, try repairing a set using contemporary test equipment, soldering irons, etc. See what the old radio repairmen had to deal with. It may make your repair jobs more *fun!*

Restoration Hints

by Wm. Herbert Brams

Old series-string AC-DC radio sets with 25 volt and 6 volt tubes often had line cord resistors or ballast tubes in the filament circuit. These are now difficult to obtain. Replacing them with a fixed resistor is dangerous as about 15 watts of heat have to be dissipated. Instead, replace them with a silicon rectifier diode (e.g. 1N4004). The heating effect of the rectified AC on the filaments is adequate to operate the tubes normally. Add a 6 volt Zener diode across the dial lamp to prevent its burning-out due to current surges when the set is turned on.



RESTORATION CORNER: THE ALL AMERICAN FIVE, By Jim McDowell

The All American Five tube radio is the most common radio design. This design became popular in the early 30s and lasted until tubes phased out. This circuit is the most widely used circuit in radio history, used in Catalins, Bakelites, and Wooden sets, as well as all kinds of novelty radios.

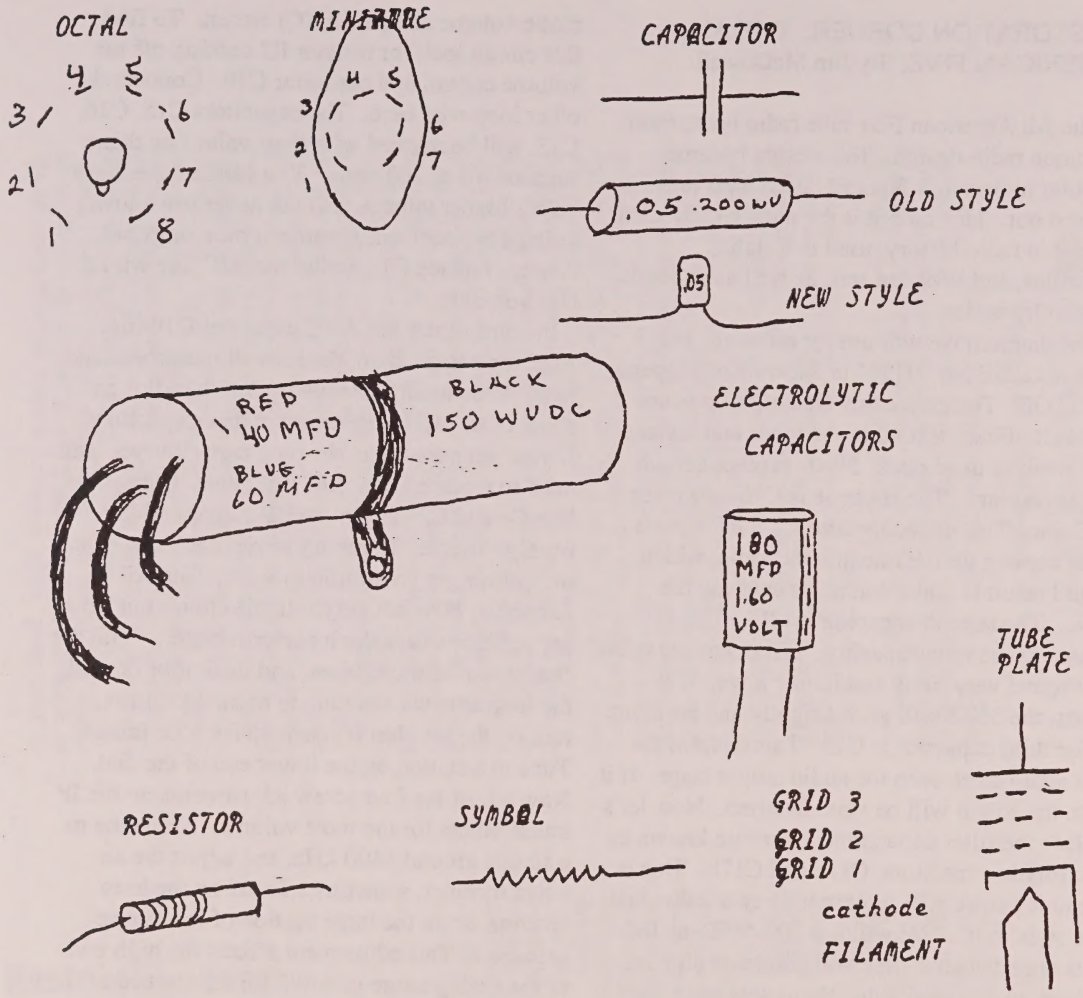
The diagram we will use for reference purposes is a GE No. HJ514 in Riders No. 11, page 11-52 GE. To service this type of radio is not difficult. First, test all of the tubes and replace any weak or dead ones. Next, replace certain key capacitors. The first one is C16 across the A/C line. This capacitor filters out RF signals from coming up the line into the radio, which would result in static and noise entering the radio. The second capacitor is C15. This is known as the tone capacitor. If it opens the radio will sound very tinny and it may howl. If it shorts, the 35Z5 will glow brightly and burn out.

The third capacitor is C13. This couples the first audio stage with the audio output stage. If it fails, the sound will be very distorted. Now let's replace the filter capacitors, otherwise known as electrolytic capacitors, C17a and C17b. This is one unit but we will replace it by two individual new style units. We will use 100-MFD-at-160-volts units because they will eliminate all hum and are readily available. Some sets use a third electrolytic. Replace this one with the above-recommended new style filter capacitor also. Be sure to observe the positive-negative polarity of the electrolytic capacitors.

Now spray the volume control with TV tuner spray as well as any other controls. We will next turn to the antenna. Most of the all American five sets use a loop antenna (a coil of wire usually mounted on the back). If your set uses this, check the wires connecting it to the radio. If one is loose and you do not know where it goes, look at the tuning capacitor, which used to be called the tuning condenser. One wire belongs on the terminal of the large section of the capacitor. The other wire connects to the automatic volume control (AVC) circuit. To find this circuit look for resistor R2 coming off the volume control and capacitor C10. Connect the other loop wire here. The capacitors C15, C16, C13, will be marked with their values on them, such as: .01 at 200 volts. You can replace these with a higher voltage unit but never use a lower voltage replacement because it may short out. Always replace C16 across the A/C line with a 600 volt unit.

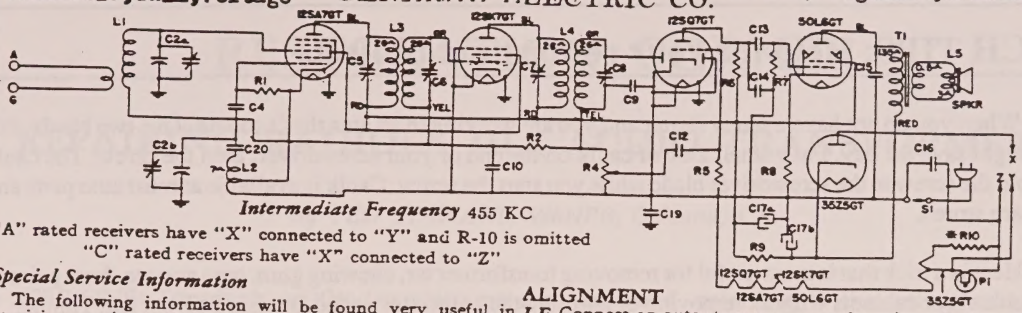
In some cases, the AVC capacitor C10 may need replacing. If so, the set will motorboat and howl while tuning. Post-war Zenith radios and some other makes use ceramic disk capacitors. If your set uses these, the only capacitor you will need to replace is the A/C line filter. Capacitors like C4 and C20 are in the RF stages and are usualy ceramic. If you try to replace them, you may never get your radio to work. The All American Five is a very reliable circuit but here are some tips to make it perform better. With the chassis out of the cabinet, and the knobs on and the loop antenna standing at normal position, turn on the set. Let it warm up for 15 minutes. Tune to a station on the lower end of the dial. Now adjust the four screw adjustments on the IF transformers for the most volume. Now tune to a station around 1400 kHz, and adjust the antenna trimmer, sometimes found on the loop antenna, or on the large section of the tuning capacitor. This adjustment affects the high end of the tuning range greatly. Be sure to use a plastic screwdriver, because these adjustments may shock you if the IF cans are "hot." Also, use plastic because a metal scredriver will detune the circuit.

Some of these radios have a metal cabinet. If so, use a three wire cord and ground the center wire to the cabinet, or mail the radio anonymously to a relative you hate! To connect an antenna to a hot-chassis set such as this, wrap an insulated wire arond the wire coming from the tuning capacitor to the loop. Connect it to the antenna. If you connect the antenna directly you may be sending line voltage up your antenna. Remember: ***Safety First!*** is the CHRS AC-DC motto. — Good luck, Jim ##



Radio Days

Thanks to simple, inexpensive receiving sets, nearly a half million Americans began tuning in to radio broadcasts. Fans stepped up to more complex equipment, including "tuning" devices and vacuum-tube detectors. • November 1921



Intermediate Frequency 455 KC

"A" rated receivers have "X" connected to "Y" and R-10 is omitted
"C" rated receivers have "X" connected to "Z"

Special Service Information

The following information will be found very useful in servicing receivers if a vacuum tube voltmeter or similar voltage measuring instrument is available.

(1) Stage Gains

	Gain
Antenna to 12SA7GT grid	3 to 3.5 at 1000 KC‡
12SA7GT grid to 12SK7GT grid	50 at 455 KC ‡
12SK7GT grid to 12SQ7GT detector plate	50 at 455 KC ‡

Gains shown in the first two stages do not contain the conversion gain which amounts to 1.1 at 1000 KC.

(2) 0.15 volt, 400 cycle signal across the volume control will give ½ watt speaker output. (Volume control turned to maximum.)

(3) Average DC voltage developed across oscillator grid leak ..... 15 volts

‡ Variations of +10%, −20% permissible.

The glass tubes used in the I.F. amplifier and 2nd detector stages are interchangeable with metal tubes.

Stock No.	Description	List Price
*RB-008	BOARD—Terminal board (2 lug)	$0.10
*RB-179	BRACKET—Cabinet back chassis mounting bracket	.10
*RB-626	BUSHING—Tuning shaft bushing	.10
*RB-1015	BOARD—Terminal board (1 lug)	.10
RB-1102	BRACKET—Condenser mounting bracket	.10
*RC-023	CAPACITOR—.005 mfd. 600 V. paper (C-13)	.25
*RC-039	CAPACITOR—.01 mfd. 600 V. paper (C-15, 20)	.25
*RC-060	CAPACITOR—.03 mfd. 600 V. paper (C-12)	.25
*RC-072	CAPACITOR—.05 mfd. 200 V. paper (C-10)	.25
*RC-092	CAPACITOR—.05 mfd. 600 V. paper (C-16)	.25
*RC-130	CAPACITOR—0.2 mfd. 400 V. paper (C-19)	.30
*RC-232	CAPACITOR—47 mmf. mica (C-4)	.30
*RC-274	CAPACITOR—330 mmf. mica (C-14)	.25
*RC-293	CAPACITOR—470 mmf. mica (C-9)	.30
*RC-863	CORD—Power cord	.30
RC-5159	CAPACITOR—30 mfd. 150 V; 40 mfd. 150 V; dry electrolytic (C-17a, 17b)	.65
RC-7026	CONDENSER—Tuning condenser (C-2a, 2b)	.70
RC-8160	CABLE—Tuning condenser drive cable	2.05
*RC-9015	CONE ASSEMBLY—4-inch Dynapower speaker cone assembly	.10
RD-147	DIAL—Dial scale	.80
*RH-111	HAIRPIN COTTER—Tuning shaft retaining cotter (Pkg. 10)	.05
*RK-074	KNOB—Volume and tuning knobs (Pkg. 5)	.50
RL-525	BEAM-A-SCOPE—Cabinet back and Beam-a-Scope assembly (L-1)	.90
RL-2025	COIL—Oscillator coil (L-2)	.30
*RTN-001	NUT—Volume and tuning control pal nut (Pkg. 5)	.10
RP-173	POINTER—Dial pointer	.20
RQ-1214	RESISTOR—13 ohms, ¼-W. carbon ±5% (R-10) (Pkg. 5)	.70
*RQ-1239	RESISTOR—150 ohms, ½-W. carbon (R-8) (Pkg. 5)	.70
*RQ-1295	RESISTOR—33,000 ohms, ½-W. carbon (R-1) (Pkg. 5)	.70
*RQ-1323	RESISTOR—470,000 ohms, ½-W. carbon (R-6, 7) (Pkg. 5)	.70
*RQ-1339	RESISTOR—2.2 meg. ½-W. carbon (R-2) (Pkg. 5)	.70
*RQ-1365	RESISTOR—15 meg. ½-W. carbon (R-5) (Pkg. 5)	.70
*RQ-1460	RESISTOR—1,200 ohms, 1-W. carbon (R-9) (Pkg. 5)	.70
*RS-238	SOCKET—Octal tube socket	.15
RS-278	SOCKET—Dial lamp socket assembly	.30
*RS-426	SPRING—Drive cable tension spring (Pkg. 5)	.10
RS-954	SPACER—Cardboard dial spacer (Pkg. 5)	.05
RS-1030	SPEAKER—4-inch Dynapower speaker (Complete with output transformer)	$3.25
RS-4002	SPRING—Dial scale retaining spring (Pkg. 3)	.05
RS-9000	SHAFT—Tuning control shaft	.10
RT-352	TRANSFORMER—1st I.F. transformer (L-3)	.70
RT-353	TRANSFORMER—2nd I.F. transformer (L-4)	.70
RT-482	TRANSFORMER—Output transformer (T-1)	.90
RT-955	TERMINAL—Antenna or ground terminal (Pkg. 5)	.10
RV-091	VOLUME CONTROL—0.5 megohm volume control (R-4)	.80
RW-046	WINDOW—Dial scale window	.15
RW-121	WASHER—Pointer felt washer (Pkg. 10)	.05

* Used on previous receivers—(Prices subject to change without notice).

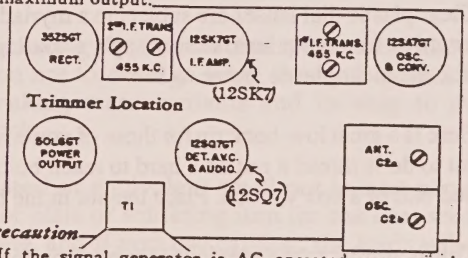
ALIGNMENT

I.F. Connect an output meter across the voice coil. Turn the volume control to maximum. Set test oscillator to 455 KC and keep the oscillator output as low as a readable meter reading will permit.

Apply signal to the converter grid of the 12SA7GT through a 0.05 mfd. capacitor and align progressively the trimmers in the 2nd and 1st I.F. transformer cans. Do not remove the grid lead from the 12SA7GT.

R.F. To insert the R.F. signal use either a standard I.R.E. dummy between the signal generator and the receiver antenna post or a loop connected across the generator output which can be magnetically coupled to the receiver Beam-a-Scope. When using an I.R.E. dummy antenna for R.F. alignment, the ground lead from the signal generator to the receiver ground post should be omitted.

With the gang condenser wide open, align oscillator trimmer (C-2b) to 1650 KC. Change generator signal to 1500 KC, tune receiver to the signal and peak antenna trimmer (C-2a) for maximum output.



Precaution

If the signal generator is AC operated use an isolating transformer between the power supply and the radio receiver power input.

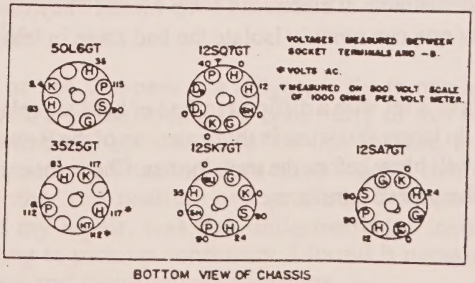
Rating	Power Supply (Volts)	Frequency (Cycles on AC)	Power Consumption (Watts)
A	115—AC or DC	40–60	30
C	115—AC or DC	25	30

Electrical Power Output (117-line volts)

Undistorted ..... 1.3 watts
Maximum ..... 1.9 watts

Loud-speaker—"Alnico" Magnetic Dynamic

Outside Cone Diameter ..... 4 inches
Voice Coil Impedance (400 cycles) ..... 3.5 ohms



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TECH TIPS: Help for your restoration projects

• When you do not have a screw starter and you are working in an area that's too tight for two hands, this trick might save the day. Put a small glob of caulk on the end of your screwdriver, then the screw. The caulk will hold the screw to the screwdriver blade while you start the screw. Caulk is available at most auto parts and hardware stores.

• Here is a trick that is most useful for removing transformer tar, chewing gum, tape goo etc. from painted metal chassis or cabinets without removing or harming the paint. It is called Bestine Solvent and Thinner. It is available from most stationery stores. Being a solvent, it does contain smelly petroleum distillates, but once dry, the smell disappears. Take our word for it; this is a "wonder" product. As with all solvents, try some on a hidden area first to make sure that it will not harm the finish.

• Liquid Wrench or any other penetrating solvent will usually go deeper into rusted threads if you apply mild pressure with a wrench or screwdriver and tap lightly on the end of the bolt or screw with a hammer.

• When using solderless terminals the "dent" in the crimp should be made into the side of the terminal opposite the seam. The idea is to prevent the seam from opening when the crimp is made.

• Clear plastic dial lenses are subject to a myriad of problems from light hazing to scratches. To remove the obstruction from your lens, simply apply a coating of Simichrome brand metal polish—with some effort, and watch the clear plastic come to life.

• Here is a great low-buck tip for those of you who get frustrated, not to mention steaming mad, when all you want to do is thread a nut on a hard to reach bolt. This tip is as simple as placing a piece of tape behind the closed end of a box wrench. Place the nut in the box wrench and you're off to the races!

• This is similar to the previous low-buck tip for those of you who want to know a simple way to thread a nut on a hard to reach bolt using a too-deep socket wrench or nut driver. Try wading a ball of paper and sticking it inside the socket so that the nut you are trying to thread is at the tip of the socket.

• New VCR drive belts come in quite a few sizes and can be found at any electronic supply store. They can almost always be substituted for a radio dial belt or tape recorder drive belt. [Thanks to Jim McDowell for this one.]

• Penlight flashlight-size broad-band RF and AF signal injectors (often called "Mosquitos" by repairmen) are often available at electronic swap-meets. They can be used to quickly inject a signal to any part of a set. This way one can quickly isolate the bad stage in less than a minute.

• Have a set with a difficult to find or hard to replace power transformer? It is wise to put a 3/16 amp. (or 1/4 amp. in larger sets) fuse in the center-tap of the B+ winding. If the B+ circuit starts to draw too much current, the fuse will blow before the transformer. Cheap insurance. Of course, this is in addition to fusing the primary side of the power transformer.

RESTORATION CORNER

REPAIRING RADIOLA IIIA AUDIO TRANSFORMERS

By TED STEWART, W6NPB, Oakland, CA.

STEP ONE: Terminals on the transformers are numbered, referring to the wiring schematic. Measure the resistances of the primary and secondary windings. Record these winding resistances together with a diagram of the terminals and their numbers.

Note: The example measurements here are ones taken during the writing of this article. The first audio primary winding measured 647 ohms D. C. R., the secondary over 1 Megohm. The primary is from #1 to #2, the secondary from #3 to #4. After repair, the secondary winding measured 8388 ohms D. C. R. The interstage transformer has a primary that measured 810 ohms D. C. R. The secondary is centertapped and is numbered 1-3-5 with #3 being the center tap. My transformer measured infinity from terminal #1 to #3, terminal #3 to #5 measured 5270 ohms. The conclusions are that both transformers have problems and step #2 will begin the attempted repairs.

STEP TWO: After unsoldering the terminals, removing the transformers, removing the covers of the coil, carefully remove beeswax, using caution not to damage leads into coil. Attach tabs to leads to indentify numbers, since you will be making measurements and its easy to mistake unmarked leads. Unsolder leads from terminal block.

STEP THREE: You should now have a stainless steel or equivalent small pot to heat paraffin or candle wax to warm up the coil assembly. Use a hot plate or soldering iron for the heat source. In a few minutes you should find the coils will separate, and if you use caution, the leads will easily come, too. In the case of the centertapped interstage, the primary telescoped into half of the secondary winding and the other half of the secondary telescoped into the primary. Observation: the construction of the transformer was apparently in stages of separately wound coils, since each coil had enough insulation and wrapping to allow separation without damaging the lead attachment.

STEP FOUR: Identify the defective coil. Remove all excess material not involved in the repair for a square foot at least. Lay the coil on a clean white cloth or paper, position your ohmmeter nearby and use a small alligator clip on one lead with a probe of copper wire on the other. It may be necessary to use something stronger, a paper clip perhaps. At least you will find it necessary to gently probe into the enamel covered wire (.0025 dia.)

STEP FIVE: At this point, the work will pay off or not. Connect one alligator clip to one lead of the defective coil. With the other lead equipped with a probe, locate the continuity of this lead to the coil winding you see at some point on the winding, by a removal of the enamel, but not damaging the wire. After you verify that the lead you have attached does have a good connection to the coil winding visible, take the probe to the other coil position and probe in the area of the attachment of the other lead and as in the case of my repair, was just underneath the insulation but did require removal of about 1/4 inch of winding to pick up continuity. I found it necessary to use a magnifying eye loupe in all of the coil probing and resoldering operations.

STEP SIX: The same process is used for the other transformers. Be careful not to break off new terminations by tight insertions of the other coil. I ran ten (10) milliamps through all repaired windings after repair to insure good solder connections were made. Each .0025 inch wire was cleaned of enamel by 00 sandpaper. Burning enamel off will work with care. Removal by chemical removers is OK too if cleaned after use. The safe method I use is to simply flood the wire with rosin core solder until visible tinning has taken place.

Finally, the overall satisfaction of the repairs was good because the transformers were well made and not difficult to repair with care. This method does take perhaps more time and care than replacing with a standard interstage coil available, but there is a pleasure to be had knowing it is an original with the thorn taken out!

It may be worthwhile to bake the completed repair in some type of compound, but if repairs are ever to be done again, maybe not. At least paraffin would not be a problem to remove in case of re-entry.

STEP SEVEN: Take and note final measurements on the transformers; in this case:

Interstage
Pri 1-2 647 ohms DCR 9 Hy Q=2.0
Sec 3-4 8388 ohms DCR 400 Hy Q=1.7

Interstage Centertapped
Pri 2-4 810 ohms DCR
Sec 1-3 7870 ohms DCR
Sec 5-3 5420 ohms DCR

Final measurements made with ESI 250 DA DC bridge.

[Editors' note: this kind of careful procedure should work with other sorts of audio transformers, one of the trickier aspects of restoration of vintage radios.]

##

THE LYSOL SOLUTION! Quick Clean-up on Old Finishes.

By ED SHARPE, Phoenix, AZ

One afternoon at my computer business, I took some time out to clean up some old wireless gear I had sitting in the back room. Since some of this equipment haled from storage sheds (with lots of mouse crap on it!), I wanted to make sure it was disinfected as well as clean.

I got my usual supply of cleaning implements out along with a spray can of Lysol disinfectant. I suppose it was thus quite by accident that I discovered a new unique use for Lysol.

Lysol when sprayed on a rag and rubbed over a messy dirty finish, will clean the dirt off, as well as soften and strip just a small layer of the top of the finish. The effect of this is to clean the item and also soften and slightly blend the finish so that small cracks and nicks get covered over.

I believe that Lysol has it's cleaning effect due to the alcohol that is in it.

I find this technique really useful when working on old pieces of pre- 1920 wireless gear that are mounted on wood bases that I want cleaned up but do not wish to strip and refinish. It is great to have an old piece of equipment looking cleaned up, but really out of place if it is refinished to the point it looks like it has just come from the woodworker.

Do not use this technique to clean something that has a nice lacquered piano finish that can be cleaned by other methods, because it will diminish the finish.

I am not certain that the above mentioned technique can be used on all finishes, but has been highly successful on some of the old equipment I have used it on. I would suppose the best bet is to try it on a small hard to see part first.

Not only does this 'Secret Process' clean, but it will also kill germs and fungus that might be living on that fine old piece of wireless gear. It is real good for mouse crap.

There are times that I have achieved the same effect as what the Lysol does by using Acetone or Lacquer thinner. The effects of these two substances is more pronounced than the effect of the Lysol, but there are two disadvantages to these two substances. The first is that they are so fast acting that you can quickly damage a finish when you least suspect it. The second problem is that both of these substances are extremely harmful to the body if they are breathed or come in contact to your skin.

Many of the substances that we use to clean old equipment can cause many health problems, either in the immediate mode, or many years later after continuing periods of exposure. Read the warning labels of all of these products, and figure whatever they say will be an understatement, as undoubtedly years from now they will have discovered additional undesirable effects from a product.

TIPS FOR SAFE USE OF SOLVENTS AND CLEANERS:

1. Work in a well ventilated area, or better yet, outside!

2. Wear gloves to keep physical contact with cleaner or solvent to a minimum!

3. Don't spill any of the cleaner or solvent on yourself, and if you do immediately flush the area of contact.

4. Wear a set of safety goggles not only from the front, but also from the sides. These are available in any store that sells shop tools. REMEMBER -- Wearing glasses will not save your eyes of something splashes in from the sides. In case you get some radical solvent in your eyes, flush with water and seek medical attention immediately. Have a hose ready before you start to work.

5. Since many solvents and cleaners are extremely flammable:

A. Do not smoke when using them!
B. Do not use near any open flame!
C. Do not use them near a heater!

COMMON SENSE:

The basic thing is to use common sense. If you do not have any common sense there are two things you can do to remedy the situation:

1. Have some one else use cleaner or solvents for you.

2. Imagine the following, either as a separate incident or happening at once:

A. Cancer of the Liver
B. Kidney failure
C. Total blindness for the rest of life
D. Your house burning to the ground
E. Your favorite radio burning
F. Brain damage
G. Various other forms of cancers causing:

(i). Death
(ii). Body parts having to be amputated
(iii). Generally overall disgusting appearance

I am sure at this point after visualizing one or more of these bizarre happenings you will acquire common sense.

The same rules mentioned in this article also hold true for finish products such as lacquer and varnishes.

[Editors' note: Also be careful sanding or filing an old chassis. Cadmium was used to plate the steel so that wires could be soldered on. Cadmium is a very poisonous heavy metal, worse than lead. If you can't remember your name or see straight after an afternoon (or a decade) of restoration work, you should have more adequately ventilated, gloved, goggled and washed.]

RESTORATION TIPS for the MAJESTIC model 71-B RECEIVER

By Chris J. Buttery

I recently acquired a Majestic 71-B receiver, where I was quite fortunate that the cabinet's condition is excellent. However, as one might have guessed, the receiver did not play when plugged in. The dealer was upfront and told me about it before I decided to buy it, so there was no harm done and I was proud of my new set. Now, I'm even more proud, since I successfully was able to get the set going--being the first project I tackled totally on my own. Regarding the history of the set, this was not the model that Majestic scooped the radio industry with in 1928, (where their total output peaked 4000 sets a day!), but this was their mid-season model introduced in January 1929. Both the 71 and 71-B have basically the same chassis, power supply and speaker with minor modifications. The 71 was housed in a typical highboy cabinet of the period. The set I obtained is contained in a very attractive lowboy cabinet. The most noticable change on the chassis is the position of the control shafts, which are spaced closer together to accomodate the newer cabinet. Also a resistor was added to the power supply.

The main problem with the Majestic products of this period, models 60, 61, 71, 71-B, 72 and 181 radio-phonograph combination, is that they all had separate power supply units which were tied to the radio chassis with a wire harness, in which the plastic wires have deterioriated over the period of some 60 years. The plastic insulation on these wires has cracked to the point where they can cause serious shorting problems with the set. It is in the best interest for the set's preservation (if it is to be played) to completely replace the wiring harness with one you can easily make on your own.

As soon as I got my set home, I removed both chassis and the speaker. I began cleaning them, and began to form the new wire harness. Aproximately 60 to 75 feet of 18 or 20 gauge stranded wire is sufficient for this project. Plan to spend a good part of a long evening to work at a confortable pace. It is also advisable that this time should be void of distractions, to prevent miswiring.

Begin by disconnecting each lead individually, starting at the terminal board on the underside of the radio chassis. Replace the old lead with a 3 to 4 foot strand of wire. I've found that it's best to solder the lead there first, then

run it to the terminal card where the other end is soldered. The weight of the chassis will help you in later braiding the wire, since it can be pulled and kept taught. After the first lead has been soldered in place, simply twist each additional lead around the previous one laid, in order to form the new harness. There are a total of 12 leads for the set. For those who get confused with the connections, or are missing the origional wire harness, or if it has become disconnected from the terminal card, use the wiring guide in figures 1A and 1B to help you with the connections. Once the wiring harness is completed, put aside the chassis and take a breather. The next step is to completely wire the power supply and you may want to attempt that project on a different day.

Remove the power supply's cover and you will notice that it is made up of 4 sections within the housing: the filament transformer, the B+ transformer, the filter choke and the filter capacitor pack. All units can be removed individually, if necessary. Replace each lead with a new wire, and remove them individually to avoid confusion with the wiring. (See figure 2 for layout of the terminals on the power supply) It will be necessary to remove the terminal strip on the top of the power supply to have access to the wiring underneath.

Examine the filter pack for leaking tar, since this may be an indication of shorting filters that overheat when the set is on. Even if the filter pack looks alright , it may be a good idea replace the capacitors, to prevent possible damage to your power supply in the event one shorts.

There are no floating grounds in the circuit and the caps are easy to replace in a set of this vintage. Loosen the bolts on the right side of the power supply housing. Then remove the leads, making note of their positions. The top terminal is the common ground for all 4 filters in the pack and can be connected as shown in figure 2. Remove the filter pack, it should just slide out. Bend the metal edge of the pack outward, so that the cardboard with the terminals on it can be removed. There should be enough space to insert new filter caps without melting out any tar, once the original leads are removed. Once the filters are in place, (I used four 10 mfd at 450 volts) and terminals are securely soldered, the pack can be closed up and reinserted into the housing. Reconnect it back into the circuit. Once this has been completed, I'd suggest a careful examination of the speaker leads. If in poor condition, also replace.

Before plugging in that power supply, make note of the following warning----NEVER UNDER ANY CIRCUMSTANCES, IS THE POWER SUPPLY TO BE OPERATED, OR PLUGGED IN WITHOUT THE CHASSIS AND SPEAKER CONNECTED TO IT. WITHOUT THE LOAD, THE B VOLTAGES WILL BE UNUSUALLY HIGH (SOMETIMES IN EXCESS OF 500 VOLTS) AND WILL LITERALLY BLOW UP YOUR FILTER

 CAPACITORS!!!--the author knows this all to well from expenience!

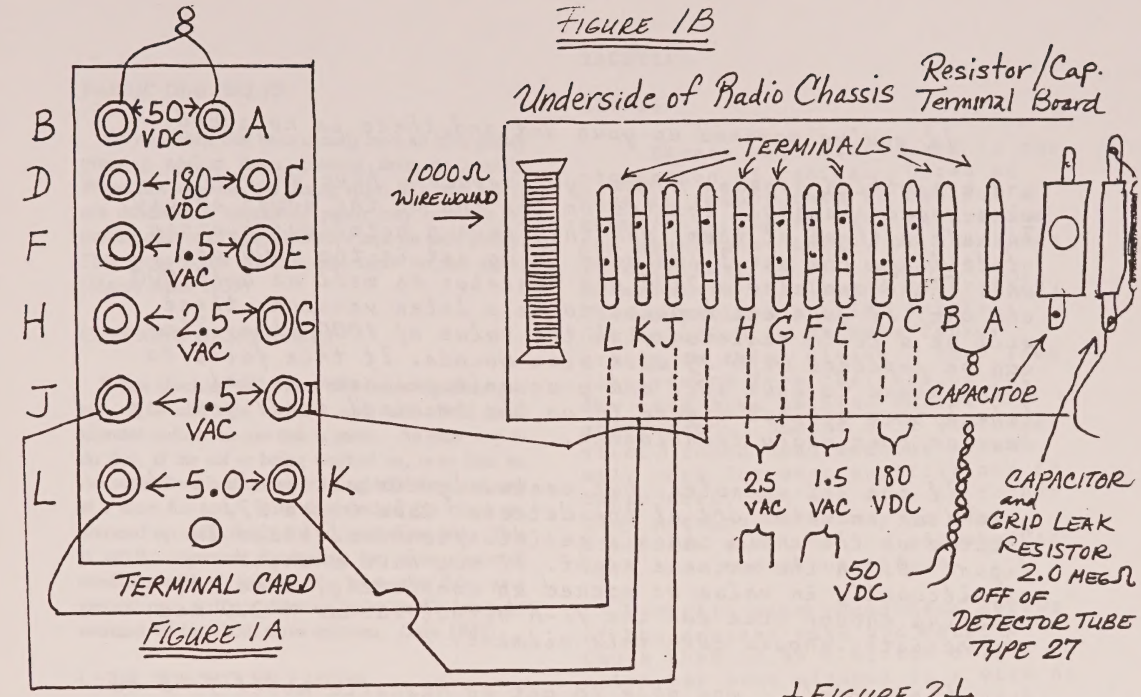
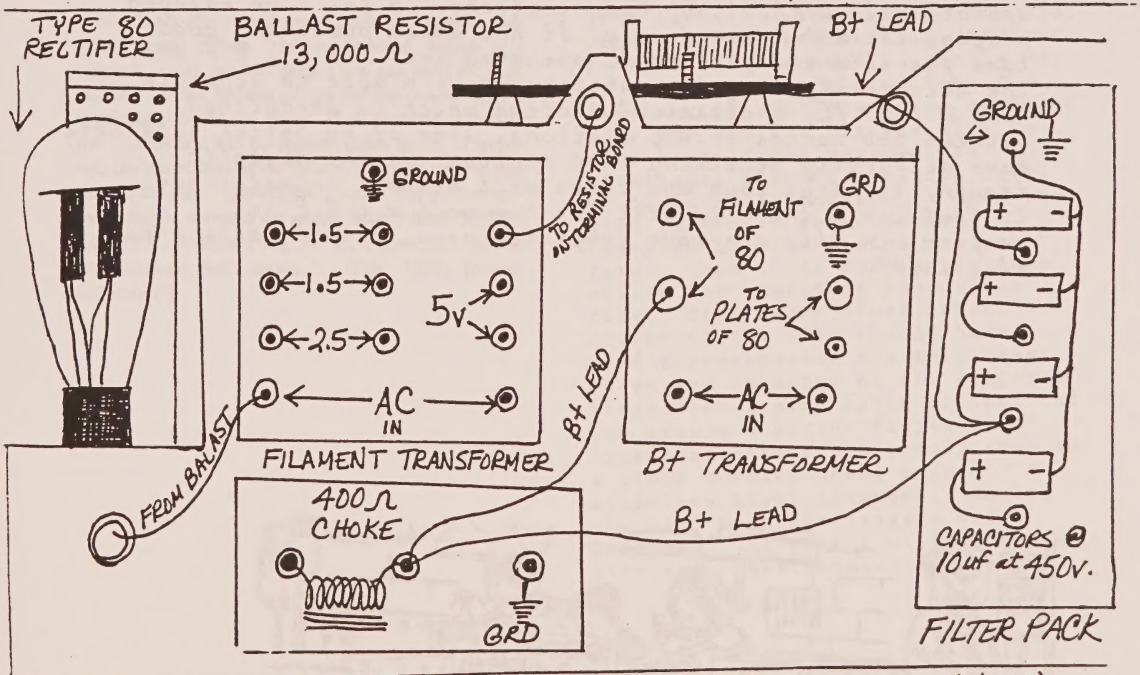


FIGURE 1B

Underside of Radio Chassis Resistor/Cap. Terminal Board

FIGURE 1A

↓FIGURE 2↓



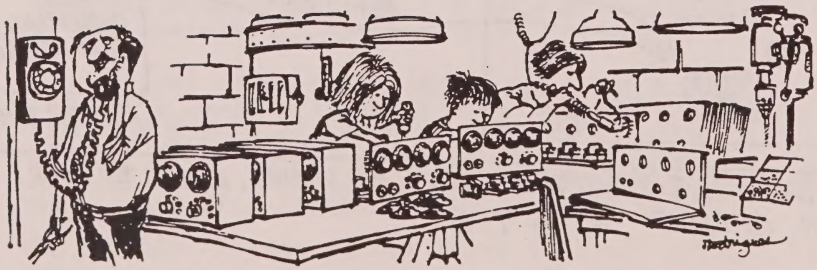
SIDE VIEW OF POWER SUPPLY (WITHOUT WIRING, EXCEPT B+ LEAD) FOR CHASSIS -70 OR 70B

If you've powered up your set and there is no sound,

and everything appears normal, you probably have an open wire-wound resistor, located on the top of the power supply. There are three of them, and they have a notorious history of failing. The one I replaced in my set is the 1000 ohm one. There are also a 2300 ohm resistor as well as a 15,000 ohm one. If your set happens to be a later version, there will be a forth resistor with the value of 1000 ohms. These can be replaced with 25 watt wire-wounds. If this fails to bring sound to your set, and your voltages seem normal, (check them against figure 1A on the terminal card) you may have an open audio transformer.

If the set operates, but seriously distorts, check the grid-leak resistor off of the detector tube (type 27), located on the radio chassis resistor/terminal board in figure 1B, on the extreme right. It may have changed significantly in value or opened up completely, thus not creating enough bias for the 71-A output tubes. A 2.0 meg ohm resistor should cure this ailment.

Fortunately I was able to get my Majestic model 71-B to operate well without any complications. So far I've enjoyed playing the set tremendiouly. It has ample power and good tone for this early of an AC operated set. For a T R F set, the selectivity is quite outstanding. I'm able to separate KDFC @ 1220 KC, a classical station which is sandwiched between two rather strong stations. Some of my better superhets have difficulty receiving that station. On the Majestic, though, it plays loud and clear with minimal interference. if that isn't the acid test for how well a T R F set performs in this air-wave congested area, I don't know what else is!!!



"Yes, this is the party that advertised a 1922 radio for sale."

FABRIC DIAL BELTS

Woven-fabric dial belts usually have an idler pulley pressing against them, causing them to stretch. When this happens, the tuning slips. If a new belt is not on hand, a temporary repair may be made by putting a layer of white adhesive tape on each pulley. This gives better traction and takes up the slack. (March-April 1939)

CHECKING GASSY TUBES

When checking tubes on a tube tester that has a gas test, it is advisable to burn each tube about three minutes before the gas test is made. As easy way to do this, if the set is being worked on, is to turn on the set and with all tubes burning take them out one at a time for test. With this method the tubes are warmed up sufficiently for an immediate test. This is vitally important for testing for some abnormal condition such as fading, etc., as a gassy tube, as a general rule, will not show up gassy until it has been warmed up for about three minutes. (July 1937)

LABEL FOR STOLEN RADIOS

No doubt many servicemen have had trouble with stolen rental radios. In our location, which is a summer resort, we lost quite a few sets until we used stickers on the bottom of the cabinet where only a serviceman could see them. If all servicemen would use this method and co-operate in the return of stolen sets the individual servicemen would suffer much less than in the past. Our stickers read: "Fellow servicemen; this is a rental set stolen from PARK RADIO CENTER, Seaside Park, N. J., Phone 265, please communicate with above." (Feb. 1937) [caveat collectors?]

TECHTIPS

RIVETS

Rivets were often used in the production of radios. Often we have to remove them to replace a component. If we lack rivets and the associated tools, or the space is difficult to get to, or the material to be riveted is fragile, then a serious problem exists. One solution is to make faux, ersatz or false rivets. They look like rivets from the outside but are used like machine screws underneath. Number 6-32 stainless steel, round head machine screws will work for most applications in radio work, but any size of round-head machine screw may be used. Stainless steel can be polished to look like nickel or chrome.

Obtain some round-head screws of the desired size and length. Chuck them in an electric drill which has been clamped in a vise or clamp so the chuck is horizontal, or a lathe. Turn on the drill and, with a fairly coarse file, proceed to file off the head in such a way as to remove the slot. Keep the file moving over the screw head and vary the angle. Results will be more even if you reverse the rotational direction of the drill or lathe occasionally. When the slot is nearly gone, finish removing it with a fine cutting file. When it is completely gone, polish the remaining head with: first, fine emory cloth; then, crocus cloth. You should have a head approximately the thickness, shape and diameter of the original rivet with a nice satin finish. If you desire a mirror finish like nickel or chrome, just buff them on a cloth buffing wheel using stainless steel compound. Rotate the head with the fingers while buffing. The result will be quite nice and almost impossible to tell

from a real rivet head. While the above procedure seems time consuming, you can make a rivet in less than a minute once yu get the hang of it.

Place the rivet through the holes of the materials to be "riveted," attach a nut and tighten down in the normal way. You can control the amount of torque to just the amount you want without fear of damaging the material. A little thumb pressure on the "head" will generally give enough friction to permit you to tighten down the nut. The other advantages is that you will be able to take it apart much easier the next time! PJB

NEW DIALS FROM OLD!

Member Chris Buttery has come up with a great way to replace radio dials that have been damaged or cracked or even are missing. If the dial is missing or severly damaged, you will have to borrow one from someone else who has the same make and model of radio. In fact, it will save uou time if you can borrow one. All that you need is access to Xerox machine. If the dial is damaged, make a xerox copy onto regular white paper and touch ip up using white-out made for xerox copies. You can even draw in parts that are missing. Take the good dial, or the copy, and make a xerox copy of it onto clear plastic made for overhead projectors. This material is made to be used in xerox machines. You will now have a perfect copy on clear plastic. This dial can be backed onto paper of the correct color. Parchment paper comes close to the color of many radio dials. For glass dials that had white lettering, use a piece of paper that matches the background color of the set behind the glass dial when xeroxing. You will have have a dark background with clear lettering. This can be backed with a white (or other colored) piece of paper. There are many off white colored papers that should work. The dial can then be sandwiched between two pieces of thin glass and the glass bound with slide binding tape found at Photo Supply stores. With a little creativity, you should be able to duplicate a lot of differient dials. With color xeroxing, now readily available, and of quite good quality, there are even more ways to creat old dials. Chris made a dial reproduction for me that was quite extraordinary. Many thanks to Chris for a wonderful idea! PJB

LIGHTNING IN MY RADIO?!

A lot of us collectors have a few old lightning arrestors or antenna grounding switches in our collections. But how many of us are using them? Lightning is as dangeroud now as it was in the early days of radio,. EVERY outdoor antenna should have an arrestor or switch attached to it. This is especially true if your antenna is out in the open. While the chance of your antenna being struck by lightning is remote, the effects of even a nearby hit are devastating. The damage to your equipment, house, and even you can be beyond imagining. Be safe, and authentic: install a lightning arrestor or antenna grounding switch soon and NEVER handle electrical equipment during an electric storm. Make sure that the ground used for the arrestor/switch is separate from the one you are using for your radios! Also note that any nearby lightning strike can overload and burn out modern FET or CMOS front ends. Use an old lightning arrestor or switch to save your new gear as well. PJB

TECH TIPS

By: Jim McDowell

1. You need a 50B5 and need it now!. All you have to do is reverse pins 1 and 2 and reverse pins 5 and 7, and now your set will use a common 50C5 tube.

2. If you need a 25A6 you can just plug in a 25L6.

3. No matter how well a radio seems to play always replace the coupling capacitor between the first and second audio on pin 5 of octal tube types and pin 4 of 41, 42, 43, type tubes. This capacitor most often leaks and will distort the sound after the radio gets warm. Also replace the tone capacitor on pin 3 of octals or pin 2 of 41 type tubes. You may also remove this capacitor if you want more treble.

4. To protect a power transformer in a set, install a one half amp fuse between the high voltage secondary center tap and ground. In some sets the secondary does not go straight to ground. In this case, place the fuse between the secondary center tap and the rest of the circuit. It is also a good idea to check all dial light wires. (See diag. no. 3)

5. In late twenties and early thirties transformer coupled push-pull type sets (some dog coffins) the tone can be greatly improved by placing a .01 capacitor in series with a 10K pot and connecting the leads to the control grids (first grids of output tubes) and then adjusting it to your taste. This adjustment works in the mid frequency range and will enhance the lows and highs if adjusted properly.

6. Tone controls may be added to any radio! To do so add a .005 mfd. @ 600 volt capacitor from the plate of the first audio amplifier through a 20K pot to ground.

7. Switches that you can't seem to get clean will clean up using Blue Stuff, a TV tuner cleaner sold only at electronics parts houses (in San Francisco, ARDCO, 1583 Howard St.) (They also supply a lot of other things that we need to repair old sets). This will also work on controls as well. Radio Shack has lots of stuff like this, and a selection of high voltage capacitors, and 1/4 watt resistors as well

8. Weak reception on a superheterodyne set may be caused by open bypass capacitors in the I. F. stages. (See diag. no. 2).

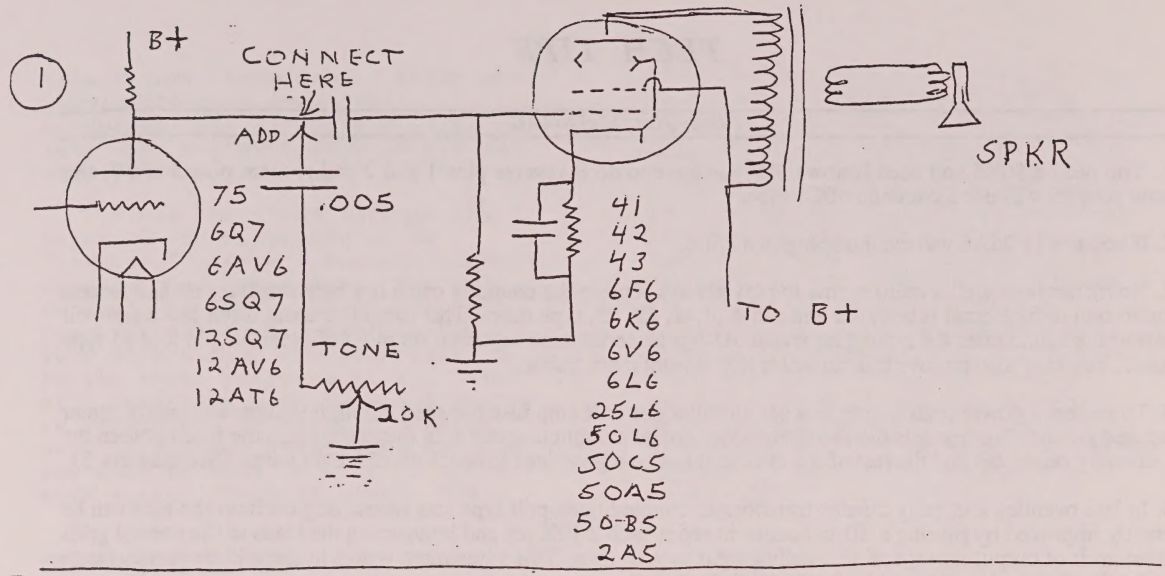
9. Those valuable little metal sets can be made safe to operate by using a grounded three wire cord and plug. Just replace the old cord with the new one and ground the third center wire to the cabinet. Make sure the cabinet is grounded by connecting an ohm-meter to the cabinet and the third (big) prong. Use these sets only on a grounded outlet.

10. Old FM band 42-48 mHz sets can be useful still to pick up TV sound. Connect the antenna of the radio to a metal plate under the TV set and tune the radio until you hear the TV sound. The sound will change as you change channels on the TV. Some TV's are so well shielded that you may have to open up the TV and glue a small piece of metal on top of the video I. F. chip and run a wire to the FM antenna terminal. Do not make any direct electrical connections to the TV!!

Have Fun!

SCIENTIFIC AMERICAN

APRIL, 1939: "Broadcasting of regular television programs to the metropolitan area of New York will start this month. The same time has been chosen for marketing the first commercial receivers. Television is bound to have profound effects on our social order. It will affect existing industries and create at least one new one. Someday it may encroach on other entertainment and educational media. Perhaps it will cause a change in the styles of presentation used in other media."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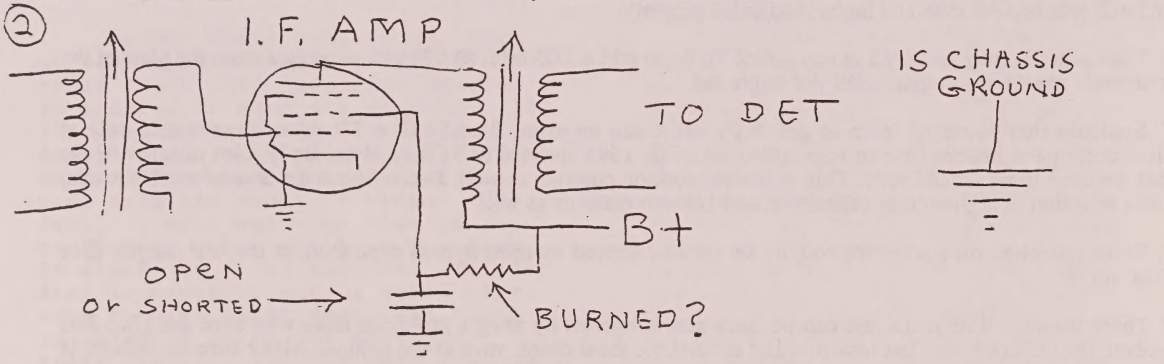
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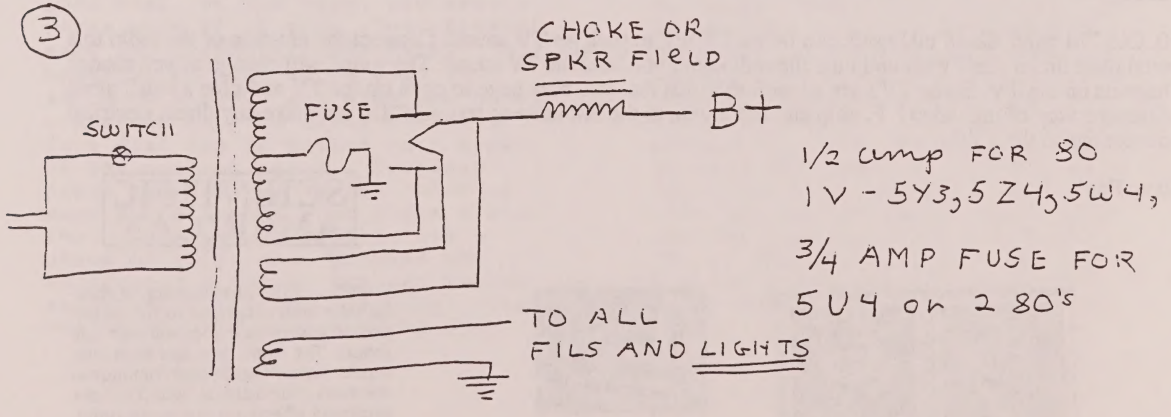
3
CHOKE OR SPKR FIELD
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FUSE
SWITCH
TO ALL FILS AND LIGHTS
1/2 amp FOR 80
1V - 5Y3, 5Z4, 5W4,
3/4 AMP FUSE FOR
5U4 or 2 80's

1989 Jim

KILLER FIBERS AND DEADLY OIL! IN MY RADIO!?

By: Ed Sharpe 2224 W. Desert Cove #205, Phoenix, AZ 85029
(602) 247-9420 (home) or (602) 861-1388 (work)

With all the outcry about the dangers of asbestos in the press these days, we maybe ought to examine some of the items we collect for this substance. Doctors tell us that asbestos causes lung problems. Its fibers embed themselves into our lungs and do not ever go away. Then they cause cancer. Asbestos will just sit there, only later to haunt us with this malignant disease, especially if we smoke.

For those of you who have somehow missed the news on all of this, many things around us have asbestos on them. Let's take a look to see how many we can find in our workshops and radio collections. Older brake shoes had asbestos in them. Remember how you used to blow that dust out of your brake drums when you had the drum off the axle to examine the brake shoes? Beware of tape around heater ducts. This will look like a grey cardboard, but cardboard it is not: It is asbestos! These are two easy forms to find.

Let's take a look at our radio collections and see what we can find. In many older radios, asbestos was used to keep the heat of the tubes from ruining the top of radio cabinets. This will be grey-ish substance, and can be in either of two forms. Sometimes we find it as a hard grey material almost like a piece of plywood, but with that familiar grey color to it. In other cases it can be softer like a sheet of soft cardboard.

EITHER FORM IS DANGEROUS!

We can also find asbestos in the old resistance type line cords that drop the voltage going to the filament circuit of the radio in question. Of course by now, many of these once useful cords are now fraying. This will expose the asbestos fibers to the air, and any movement of this cord will cause asbestos fibers to become dislodged and become airborne. Yep! They are now headed for your lungs! Especially if you breathe.

Some ballasts will merely consist of some resistance wire wound on an asbestos form. I can also remember some electrical and radio equipment that used this form for voltage dividers in the B+ section of the power supply. You need to beware of these!

Do not confuse mica with asbestos; they are clearly different, both in color and level of harm. Mica, I do not believe, will have any harmful effect on you, whereas asbestos will be grey-ish in color and is harmful. Mica will also be transparent and look almost like plastic or layers of glass that is laminated.

THE OIL OF DEATH!

Much has been in the news lately about the danger of a chemical substance named PCBs (Polychlorinated BiPhenols). In the Thirties, Forties and even later, these substances were used as an additive for oil filled capacitors to increase their breakdown voltage level. Now you may be asking how this affects you as a radio collector, right?

Yes, many of those oil filled capacitors in your favorite old radio and audio equipment have PCBs contained within the oil that is used as a supplement for the dielectric. Yuk!

(DEADLY... Cont'd.)

Some of the most dangerous accumulations I have seen of these type of oil filled capacitors are in World War II military radio equipment. These capacitors will rear their ugly little heads in both receivers and transmitters. When these capacitors were manufactured, they were high reliability JAN-spec components: however, with the passage of time, these units begin to leak, oozing oil from around the seals on their terminals. The round, black capacitors with the stripes around them (similar to resistors) also are oil filled and common in post-war radios, TV's and audio equipment.

I would not advise disposing of these old capacitors by merely throwing them away, as once they get covered over by dirt in the city dump and the rain falls on this dirt the PCBs will be driven straight into the water table for you and your children to drink. Instead a discrete inquiry of your local branch of the EPA or your state government's hazardous waste department will tell you a safe place for the disposal of these carcinogenic little devils! Be discrete inasmuch as you would just as soon avoid a full fledged EPA raid on your radio collection construed as an illegal hazardous waste accumulation!

THE VACUUM TUBE, A REPAIR THAT SAVED AN OPEN FILAMENT

By: Ted Stewart, W6NPB, Oakland, CA

This is the story of an experiment that paid off after trying to save an unusual and special vacuum tube.

I'm restoring a Telefunken Opus 50 receiver, and during the entire repair and realingment of the set, the eye tube had no visible display. Close inspection of the tube through the clear area of the envelope, using an eye loupe, disclosed a .002 inch gap in one of the filament leads at the base of the element support. The tube is a type EM-11 Telefunken multi- eye. Having no data or basing diagrams for this foreign type, the first requirement was to identify the two leads running from the tube base pins to the filament leads inside the envelope. This was done as follows: provide a source of high voltage, high impedance that will jump the gap inside at the break.

I used a Stancor P-8150 power transformer that has a 1500 volt-1.5MA, and a 2.5 volt secondary. Do not use the 117 VAC primary. Arrange the 2.5 VAC filament as a DC input winding. Shunt the winding with a 1 MFD cap. Arrange to pulse the winding with a DC voltage of 1-6 volts. You'll need several amps available for this winding. The object here is to generate sufficient voltage at the secondary HV winding to jump at least a 10 to 20 thousandths gap. After you have identified two pins as correct for the filament, increase the DC potential to increase the discharge in the tube at the location of the break or poor weld. In my case, I found that the arcing of the break actually welded the gap with material. A check of the continuity was positive, and the set was turned on. The tube glowed brightly, and the green four segment display was a sight for sore eyes! The EM-11 is a four section display and it closes all four gaps simultaneously.

No statement is made as to length of time such a repair will continue to operate. Any extra time is your gain. As of this writing, the tube is still glowing. The set has had about ten cycles of off-on operation, and the tube still rewards with a fine happy green glow! Those of you who try this have nothing to lose if your filament is open. Try it and you may be pleasantly rewarded. Trying this on a metal tube is really an in the dark operation, but at least you know which pins are the filament. I look forward to hearing of others who have been rewarded with this procedure.

THANK YOU JOHN ECKLAND:

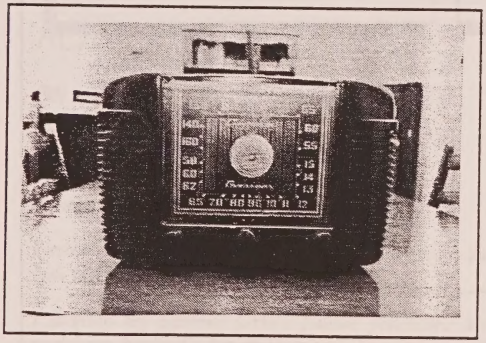
A special thanks to member John Eckland for putting that fantastic photo swap meet ad for CHRS in the October issue of Antique Radio Classified. Those of you who have not seen it should look: it is great!

Improve the Performance of Your AC/DC Sets

By John D. Eckland

Below are some useful circuits for improving reliability and performance of AC/DC sets using resistance line cords or ballast tubes. In some cases a partial or complete tube line-up change would be necessary. These changes are recommended for sets intended for continual or daily use. These conversions also apply for 'battery' editions of conventional AC/DC table sets.

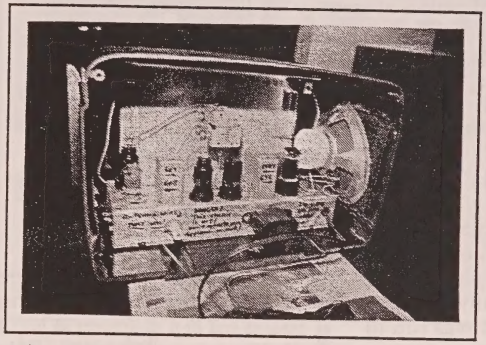
I recently received a Crosley bakelite table radio of the "American/Overseas" variety. Instead of the usual AC/DC or AC tube lineup, this set was to operate for dry batteries; 90 VDC for the plate supply and 1.5 VDC



for the filaments. The tube complement was typical for a set of this type: 1A7, 1N5, 1H5, and 1A5.

Here's how this butcher job began *(AC radio renegades listen up!)* I pulled out a chassis punch and removed the 3/8" slug for the rear apron of the Crosley chassis. I then installed a rubber grommet and threaded through a hank of 18 gauge zip cord, tying a knot in it. Next I installed a double 8AG fuse holder nearby on the inside apron and soldered the cord to one side of the holder. I could continue on, step-by-step, however I trust the following schematic will suffice.

> *"...These sets present a shock hazard and must not be operated near a sink or any grounded appliances."*



Anyway, I selected a 6A8 to replace 1A7, a 6K7 for 1N5, a 6SQ7 for 1H5, and finally a 6Y6GT/G for the 'wimpy' 1A5 output tube. I fitted the set up with a new speaker assembly. Originally a 5" permanent magnet unit with a 25K Ohm/4 Ohm output transformer (very difficult to locate, today) was used. Now the speaker is 5"x7" with a 4 Ohm voice coil and a 2000 Ohm to 4 Ohm output transformer. The latter is much easier to find.

I could have selected tubes for use in series string, however I chose tubes for use in parallel to minimize 'flashing' of the heaters during initial power-up. As I feel this greatly reduces the lifetime of tubes as well as pilot lamps. This undesirable flashing of heaters and lamps also occurs in sets with diode replacements for resistance line cords or ballasts. The optimum filament transformer selected to operate these tubes and several pilot lamps is rated 6.3 volts AC at 3 amps. In this particular chassis there is plenty of room to mount a filament transformer, output transformer and filter choke. These parts can be obtained from swapmeets and junked sixties' vintage table sets.

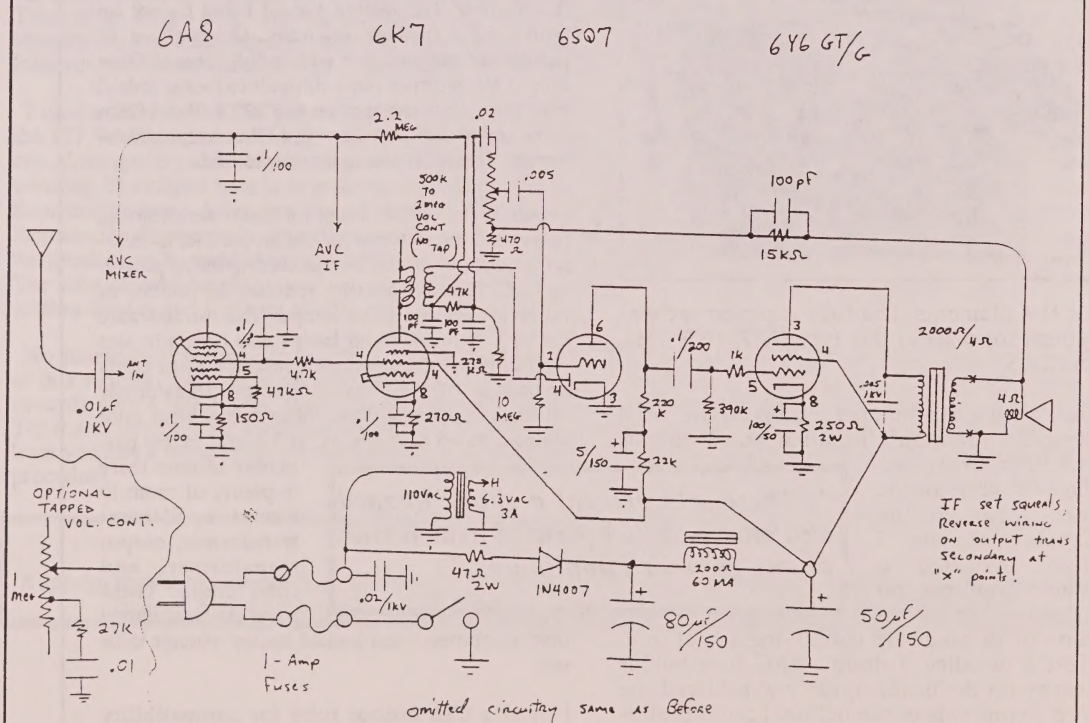
I used a 6Y6 output tube for compatibility

with extant output transformers in most AC/DC sets, its copious supply and awesome power output of up to 3.6 watts! To improve the tone quality replace the volume control with a tapped type (as shown) as well as application of inverse feedback (also shown).

I cannot overemphasize that these sets present a shock hazard and must not be operated near a sink or any grounded appliances. I affix a sticker on the back of all AC or AC/DC table sets and inform the owner as well.

Photos of the completed chassis are shown. Although the radio is no longer 'original' the set plays beautifully now, and was fun to restore.

John Eckland restores vintage radios, televisions and hi-fi equipment as his vocation. He likes to 're-engineer sets', and has been involved in the old radio hobby since early childhood.



Annual San Francisco Swap Meet
Saturday July 10th, 1993

Swap meet host John Wentzel (L) and Alfred Woolf (R).

Let's make a deal!

AC/DC SAFETY – A Letter

Bill McGowan
2029 Harbor Blvd. #9
Costa Mesa, CA 92627

Editors:

I recently rejoined the club and sold at the recent San Luis Obispo show.

I received my Summer CHRS Journal yesterday, and read John Eckland's Article "Improve The Performance of your AC/DC sets." John rebuilt a Crosley Farm Radio. In its original condition the radio did not present a AC shock hazard, as it was a battery set. John's article states several times that this chassis presents a shock hazard. But if you look at the schematic it is more than a shock hazard.

It is ***deadly.*** One side of the AC line goes to the chassis via a lamp fuse and the on-off switch. If the AC plug is inserted into a now polarized wall outlet the wrong way, the chassis is at 117 VAC above ground. There are a lot of old houses which do not have polarized AC outlets. I have seen AC cords with non polarized plugs. Also, the fact that a wall plug is polarized does not mean it is wired correctly. John added a 6.3 VAC filament transformer, a choke, and a new output transformer, which was a lot of work. He ended up with a deadly chassis. One solution would have been to use a standard power transformer with a 3 AMP 6.3 VAC filament winding. By using a bridge rectifier he could eliminate the choke, because he would now have full wave rectification. The choke would be replaced by a resistor of the right value and wattage to achieve the DC voltage required. The value of resistor would also depend on the AC secondary windings of the new transformer. I would try to buy one at an electronic swap meet. In that case, you really do not know what you are buying, but sometimes the values are printed on the case.

I have a Westinghouse Model H-147 built in 1947. It is a standard 5 tube set using miniature tubes. I recapped the set and was surprised to see that I had a deadly chassis. See the schematic. Westinghouse must have realized it was a deadly chassis, as they used a double pole single throw on-off switch. I wonder how many people received the shock of their life when the set was on. (In 1947, polarized house wiring was not used as far as I know.)

I believe the easiest thing for me to do with this set is to lift all the chassis grounds and install a floating ground buss. The floating ground buss is then connected to the chassis via a 150K resistor and 0.1 mFd cap. Philco was using this method by 1951. This circuit reduces the current to a safer value.

In all cases, anyone repairing AC/DC radios should use an AC ***Isolation Transformer,*** which can be obtained from Antique Electronic Supply in Tempe, AZ. This will prevent you from receiving minor shocks if the capacitor from the floating ground buss is good, or a deadly shock if it is shorted.

Good Luck,
Bill McGowan

CPR FOR AUTO RADIO VIBRATORS

by Larry Drees, from the Northern California Newsletter of the Cadillac La Salle Club, Vol. 92, no. 4

If your "pride and joy" dates back to the mid '50's or earlier, chances are that its radio is "blessed" with a vibrator power supply. The vibrator internally works much like a door buzzer. When power is applied to its coil, the armature is attracted to the coil. The first contact closes, shorting the coil and the coil loses its current. As a result, the magnetic attraction ceases and the armature springs away from the coil. The second contact then closes. This occurs approximately 115 times a second. This action is used to "fool" the power transformer into thinking that alternating current, AC, is applied to its primary, by alternately grounding each end of the primary with the battery supply connected to the center tap of the power transformer.

When your radio has not been used for a long period of time, the vibrator contacts may oxidize and leave you with silece instead of the familiar hum of the vibrator and the sound of your favorite "oldies" station. When you finally find that spare vibrator you wisely salted away ten years ago, you find that it also fails to function. You may be able to coax one or both of the vibrators back to life using a simple trick I learned some years ago from Carl Larry Steig. Carl credits Skinned Knuckles magazine as his source.

THIS DISCUSSION DOES NOT APPLY IF YOU HAVE INSTALLED A SOLID STATE REPLACEMENT FOR YOUR ORIGINAL TYPE VIBRATOR. Solid state vibrators are notoriously unforgiving of even momentary overloads or incorrect polarity. Do not use them to troubleshoot another defective radio. The buffer capacitor should always be replaced before a new vibrator of either solid state or original type is installed.

The 6 or 12 volt battery supply is not sufficient to break through the undesired oxidation on the contacts. The application of 120 volts AC (with current limited by a 60 watt light bulb) to the contact connected to the vibrator coil will often break through the oxide. The lamp should glow at about 1/2 of normal brightness as each vibrator contact is closed less than 1/2 of the time. A pulsing of the lamp brightness is often seen as the vibrator frequency of approximately 115 Hz. beats with the 60 Hz. line frequency.

A second 60 watt lamp connected to the second (non-coil) contact of the vibrator will remove the oxide from it. This is important, because although the vibrator may vibrate, loss of the second contact would result in a low D.C. plate supply voltage. Both lamps should glow at approximately equal brightness.

A NOTE OF CAUTION; Remove vibrator from the radio for these tests. Always unplug the 120 VAC when making connection to the vibrator. Keeps hands clear of the vibrator when the 120 VAC is applied. Do not leave the 120 VAC connected any longer than required to remove the oxide to lessen the chance of damage to the vibrator. [Using an isolation transformer and a ground fault circuit interrupter are also good ideas].

Diagram A shows the connections to a twelve volt, three prong vibrator used in 1953 and later radios using vibrators. Diagram B applies to six volt, four pin vibrators used from 1940 through 1952. Note the two different internal connections and two different pin diameters. Cadillac used several types of synchronous vibrators prior to 1940. The contact arrangements are too varied to cover in this article. These vibrators use a second set of contacts instead of a rectifier tube to produce the plate supply voltage. The second set of contacts must also be free of oxide to produce the proper plate voltage. The same testing principles apply to these vibrators. One lamp is used to find the contact associated with the coil and make the vibrator vibrate. The second lamp is used to "clean" each of the remaining contacts in turn. Mark the installed position of the vibrator before removal from the radio as some of these vibrators can be rotated 180 degrees, which will result in the wrong polarity of plate supply voltage and non-operating of the radio. ##

Diagram A shows the connections to a 12 V. 3 prong vibrator used in 1953 and later radios using vibrators.

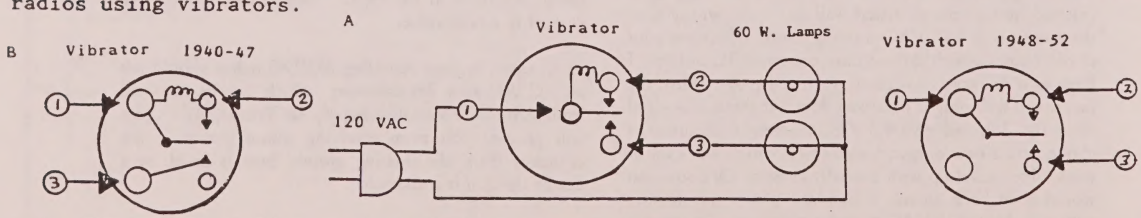


Diagram B applies to 6 V. 4 pin vibrators used from 1940 thru 1952. Note the two different internal connections and two different pin diameters.

RESTORATION CORNER

By Bart Lee, xWPE2DLT
327 Filbert Steps
San Francisco, CA 94133
(415) 788 4072

When you've stripped and sanded that radio down to bare, thirsty wood, wood that has needed help for maybe sixty years, several alternatives present themselves. It is possible to recreate that French polish finish, but it is an heroic endeavor. Polyurethane is available by the gallon, but it is a sin. A middle course is, however, readily at hand. There is a bottled wood stain with a dab-on applicator sold under the brand name E-Z Scratch Remover. It is a penetrating, red-brown stain, nearly cherry. Unlike pigment stains, E-Z pervades the wood fibres (especially thirsty fibres), not only at the surface but to some depth. A bottle will do several radios. The result is deep patterns of grain and texture. On a good veneer, the wood glows with depth. This is not the reflective depth of high polish, but rather an inner depth as the stain variously highlights different wood fibre patterns of the grain. It is a most pleasing result, especially for a basket-case cabinet.

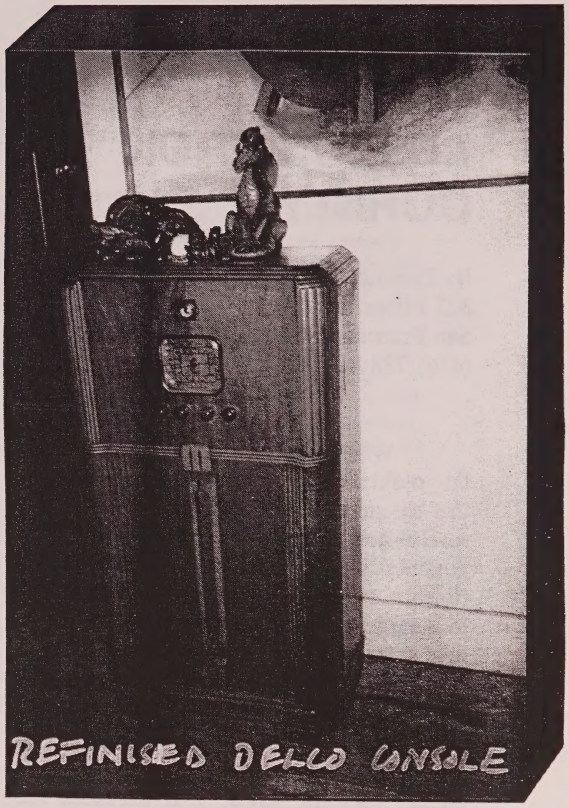
The two radios appearing nearby have had the benefit of this treatment. The Zenith chairside was deeply ringed from what I hope was many a happy highball imbibed while listening to the BBC. The console was the worst radio I've ever seen at a swapmeet; peeling veneer, waterstained, sunburned, warping and cracking. After sanding and steel-wooling to bare wood all around, I followed the E-Z stain with red-oil furniture polish. When the wood is old and dry, this does not leave an oil residue after serious soft, dry cloth buffing. Elbow grease will prevent a greasy-appearing surface. The result is the stain's glow sustained by the polish. Try it first on an old radio with nothing left to lose. You will be pleased.

Although polyurethane is generally a bad choice for restoration, it does have its uses. In the console pictured here, a Delco from 1937-38, the top was warped, cigarette-burned, ringed and desiccated. I took it down to bare wood, filled it, stained it, and then coated it with tinted polyurethane. This created a thick protective surface on the top of the console. Polyurethane can also be used underneath to counterwarp a bent wood piece. If I'd had a piece of beveled glass to fit the top, I might not have been tempted to use the polyurethane. The technique did work, however, and the top is nearly indestructible, and it looks good, too.

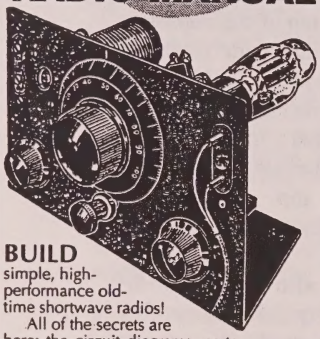
The knobs are also coated with polyurethane, on the theory that they get the most interaction and need the most protection. This radio, fully restored electronically as well, is working, albeit retro, house furniture. (I earned my Radio Yugoslavia QSL card on this radio in my living room, shortly before Yugoslavia discombobulated). If polyurethane coatings had been available to furniture makers in the thirties, I think they would not have hesitated to use them for protecting tops and other at-risk surfaces of wood radios. Go, likewise, and feel free to do the same.

For those of you interested in electronic restoration of 1930s and 1940s radios, there appears nearby a diagnostic chart. *Mechanix Illustrated* provided it in its RADIO MANUAL at the beginning of World War Two, a time when repair was the only option, no new sets being manufactured

because of the war. Today's restoration dilemma is capacitator replacement: all or only the bad ones. I replace them all, because it is only a matter of time until another paper cap goes. May as well do it all at once, and keep the radio going another forty years! If there's time enough, sure, put the new caps into the old paper cylinders. -73- Bart. ##



Official 1934 SHORT WAVE RADIO MANUAL



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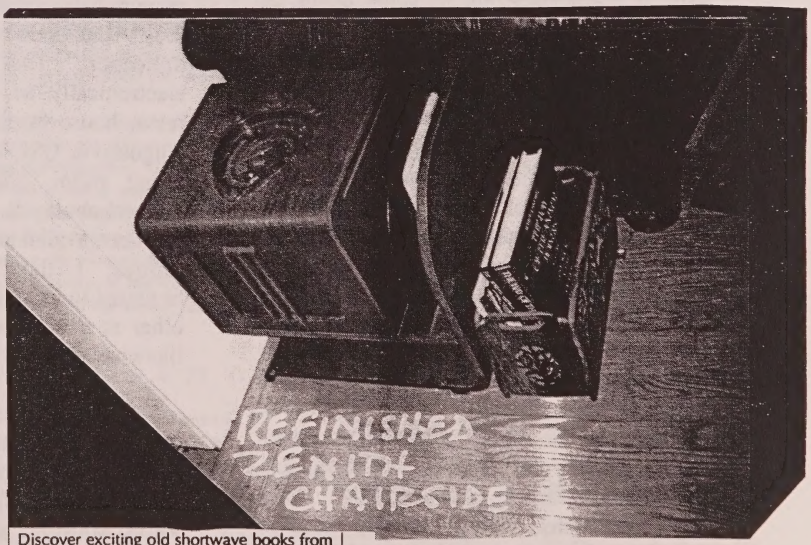

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The Antique Wireless Association shares these old HINTS and KINKS with C.H.R.S. in honor of its 20th Birthday, courtesy of Lud Sibley:

REPAIR/RESTORATION HINTS FROM THE *C-D CAPACITOR*, 1940-42

ELIMINATING "CUT-OUTS"

Receivers which "cut-out" often present service jobs requiring the expenditure of time and labor for which adequate compensation cannot be secured. Condensers are, of course, first suspected, then resistors, tubes, connections, and windings. Yet we can quite often eliminate each of these potential sources of the trouble - and the receiver still intermit.

Frequently, the particularly difficult intermittents can be speedily cured by proper attention to trimmer and padding condensers. Sometimes it is only necessary to remove the adjusting screw and clean and free the mica separator and plates of dust and filings. Most often, however, these capacitors cause "cutting-out" through a leaking mica separator and, in such instances, a new piece of mica will terminate the erratic performance of the receiver.

A signal tracer may be required to accurately locate the offending trimmer instrumentally. Occasionally, the receiver can be made to "cut-out" at will by turning the adjusting screw or by squeezing the plates together by pressing on the top plate with a screwdriver or other tool. C-D Capacitor, 9-40.

SHORT CIRCUIT LEADS

In many models of sets manufactured a year or two ago rubbercovered power transformer leads were employed which often caused short circuits as the result of the older type of rubber insulation melting or breaking off after hardening. Sets will thus be found inoperative, the power transformer will overheat and smoke, or filament of tubes will not light. To service such jobs, first inspect the leads from the power transformer to tubes. Then separate them, or if necessary, replace the leads with heavier insulated wire. C-D Capacitor, 9-40

LEAKY CAPACITOR BLOCKS

If abnormal voltages appear on cathodes of audio tubes, or hum prevails even though individual sections of a capacitor block check OK., test for leakage between sections of the unit. Leakage between sections in many of the capacitor blocks used in the lower priced sets seems to be a common fault. Neon leakage test between capacitor sections will reveal the definite source of trouble encountered. The remedy, obviously, is to replace faulty sections with individual units such as C-D "Beavers" or multiple section units of the same values and voltage ratings. C-D Capacitor, 10-40

LOCATING DEFECTIVE CAPACITORS

In the intermittent jobs which are usually so puzzling to servicemen, the writer has employed a very simple method to locate defective capacitors quite satisfactorily. Remove all tubes from the set and apply a DC voltage to the plate and screen grid circuits. A voltage from 300 to 400 volts will be ample. A capacitor in the circuit which is causing the intermittent will readily be located be sizzling, and finally breaking down. Thus the stage causing the trouble can be located, and the defective capacitor replaced with a new unit. C-D Capacitor, 10-40

ZENITH MODEL 8S359

Hum in this set as well as other of this type is often caused by a defective 6U5/6G5 tuning eye tube. Before removing the chassis of any set employing this type of tuning eye tube, the writer has made it a practice to remove the tube in order to determine if the trouble is caused from this source. If the hum stops, obviously, replace this tube with a new one. C-D Capacitor, 11-40.

REPAIRING VOICE COILS

Here is a good way to repair speakers which often have been found to cause distortion. In many cases the first few turns of the voice coil work loose and cause the trouble. In speakers where the cone can be raised carefully far enough to apply a thin coat of aeroplane dope or collodion glue to the first few turns of the coil. This will alleviate the trouble which quite frequently is the result of loose turns of wire on the voice coil. C-D Capacitor, ll-40

AN IMPROVISED BALLAST

A 150-watt Mazda electric light bulb makes a dandy ballast for many models of sets such as the Silver model 30. The writer uses an old 4-prong

tube base and removes two of the prongs diagonally. Short flexible wire connections are then soldered from the bulb to the two prongs of the tube base. The bulb base is then carefully inserted into he tube base so that connections do not short, and held in place by filling with hot sealing wax. C-D Capacitor, 3-41

PREVENTION AGAINST SHORT CIRCUITS

A majority of AC-DC receivers have one side of the power line tied directly to the chassis through the on-off switch. On such receivers, particularly those encased in thin plastic cabinets, the chassis holding bolts protrude sufficiently so as to prevent these sets from short circuit hazard, since many people place these sets on top of unprotected radiators. Whenever tests of this type come in for repairs the writer places two or three strips of adhesive tape over each screw head of the chassis bolts so as to completely overlap both screw and washer. C-D Capacitor, 9-41

REJUVENATING OLD VOLUME CONTROLS

This method to renew old carbon type volume controls has proven satisfactory with most all designs of controls, claims the writer. Remove the carbon element of the control and apply a thin coat of aeroplane "dope" on the contact surface. Before the dope has become dry, dust the surface with powdered carbon such as used for auto door locks, etc. Blow off surplus carbon powder and apply a thin coat of clear lacquer thinner with a camel's hair brush. Allow the thinner to dry thoroughly, then check the resistance of the unit with an ohmmeter. If resistance is too low apply the thinner again and rub off some of the carbon with a clean, soft cloth and recheck the resistance until the proper value has been obtained. A little care and patience will pay for the time taken to renew many of the old unused controls lying around service shops. C-D Capacitor, 4-42

METAL-CLAD RESISTOR REPAIR

Poor contact at a tap on a flat type metal-clad wire-wound resistor can often be corrected by means of a simple operation with a screwdriver. Since these resistors are usually mounted flat against the chassis with the metal casing riveted to the chassis at both ends, place a screwdriver between the chassis and the resistor at the faulty tap and bend it up. The bent metal resistor casing forces the tap into tight contact with the resistance winding without affecting the rest of the unit in any way. C-D Capacitor, 4-42

SEPARATE LOOP FOR ALIGNING WORK

Many of the newer sets using built-in antennas require the use of a loop to line up the set instead of using direct connection to the oscillator. We have installed a loop of a few turns of wire which is fastened under the work bench. The leads of this loop are brought out to binding posts so that the oscillator can be connected to it. When lining up a set the set is placed into he field of this coil and adjustments made. C-D Capacitor, 6-42

"SERVICE TIPS" (and a few "SELLING TIPS") from *RCA Radio Service News*, 1935-39 and 1947
No evidence of a copyright notice on the originals.

LOUDSPEAKER FIELDS

The next time that you get a call and find an open speaker field, don't be in too much of a hurry to replace the field. Take the field out and remove the paper coating. Ten-to-one you will find the field open where the fine wire is joined to the heavy wire that is brought out from the field. All that is necessary is to re-make the connection and the field is as good as new. (Feb. 4, 1935)

NEUTRALIZING

In neutralizing some of the old sets, a good tube from which one filament pin has been cut off is often used. However, due to the fact that tubes vary in their internal capacity, this does not always work. A better way is to use the tube that is to be used in the stage under test by slipping s short length of drinking straw over the filament pin. This never fails to work and permits a more accurate neutralization job that avoids possible oscillation. (Dec. 1935)

MIDGET SPEAKERS

When you have a midget speaker on the bench that is hard to center, just hook the field coil and the output transformer in series and connect to the 110-volt AC line. Proper centering is indicated when you hear nothing at two feet. however, if the cone is rubbing, the sound will be very bad. (Dec. 1935)

EMERGENCY RECEPTION

On some superheterodynes, emergency reception may be provided by connecting the grids of the first

and second detectors together, thereby eliminating a defective oscillator or IF amplifier, and making the receiver work as a TRF job. (Dec. 1935)

MAGIC-EYE TUBES

If the 6E5 tube is operating but the screen is a very pale shade of green, check the 1-megohm resistor before condemning the tube. Very often this resistor will be found to have changed its value. (March 1936)

COLOR CODE

Radio servicemen are often unable to determine the value of a coded resistor because they do not know the color code and have lost or misplaced their trick color-code cards. All of them, can tell howmany days are in each month by the old ditty, "Thirty days hath . . .etc." The following catchphrase is almost as simple. It is necessary only to remember the code begins with black ("0") and ends with white ("9"), and that "Mr. BROYG wears BVGs." The letters BROYGBVG can then be counted on the fingers of one hand, and - presto! - there is the value of the unknown. (March 1936)

CLEANING CABINET

For eradicating acid [*sic*, but it's still caustic!] on chassis caused by capacitors exploding, use a good mechanic's soap on a dry rag. It works wonders. (July 1936)

INCREASING SELECTIVITY OF TRF SETS

When an old set becomes less selective, especially an old TRF set, the best solution is of course to sell a new radio, but when that cannot be done and the customer wants to get certain stations, add a little feedback to the second RF stage by twisting a turn of insulated wire between the second- and third-stage grids and adjust for best results. A small trimmer condenser on the first stage and attached to the panel can be used to best advantage in this case. (July 1937)

REPAIRING SHIELD

I had a set in which the grid lead coming out of the IF shield had been pulled so hard that it had ripped the shield about an inch and a half. The lead was replaced and the set was otherwise OK after realignment, but that shield with the cut down the side looked terrible. Tin foil was much too bright. However, I found a deluxe wrapping paper in a so-called gold and silver finish. The latter is actually a dull aluminum and matched perfectly when affixed with waterproof cement. (July 1937)

MAJESTIC 90 and 90B

When you have to replace the line-ballast resistor in an old Majestic 90, 90B, etc., try rewinding the old form with wire from an old 20-ohm rheostat from a battery set. The wire is just the right size and length. It is also heavier wire than the original and will stand up better. (July 1937)

SAFETY-FIRST TONGS

While servicing a set "hot" I have found a pair of photo print tongs, made of bamboo and available in any photo-supply store, of value since loose connections can be spotted by taking hold of individual wires with the tongs and shaking them. As the tongs are non-metallic, danger of shorts or a bad shock are eliminated. Also, parts may be held in place for soldering without danger of burned fingers. (Nov. 1937)

DRIFTING ON HIGH FREQUENCIES

With an Atwater Kent 318, I experienced some trouble with drifting on the high-frequency end of the scale. I found that I could eliminate this trouble by cleaning the oscillator trimmers. (This tip applies to all receivers - RCA ed.) (Nov. 1937)

QUICK TEST FOR AC-DC RADIOS

A short cut in locating open filament circuits in AC-DC sets
quickly (and who doesn't need short cuts on AC-DC sets?) is to use a 15-watt 110-volt lamp bulb on a length of lamp cord, with prods on the free ends. Plug the dead set into an outlet, turn on the switch, and test the wiring beginning with the AC line cord entering the set. If there is voltage there, the lamp will light. If not, carefully examine the line cord for breaks, and repair if found. If the line cord has a resistance in it, check the resistance lead at the plug. I have found many a broken lead here due to amateur repairmen putting on a new plug. (They don't see the small resistance wire, so don't connect it up.) If you have voltage at the set, test each tube filament with the prods, and the one causing the test lamp to

light is your bad tube. A simple and QUICK way to locate open filament wiring, and it really does save time over testing each tubeseparately in the checker, and does not burn out the rest of the tubes like you do sometimes if you try shorting filaments to accomplish the above results. (Nov. 1937)

LINE CONDENSER

I have made it a point to check the line condenser for "shorts" or "leaks." A bad condenser will result in a burned-out antenna coil if a radiator or water pipe is used as an aerial. And plenty of radiators are used as aerials! (June 1938)

NEW SET SALES

I have made many radio sales by close observation of the prospect and his family. For example, if there are children around ten or eleven years of age in the family, I tune in on police calls or aviation and amateur calls. This fascinates them, and they use their influence toward keeping the receiver. If the parents are of foreign extraction, I tune in one of the shortwave stations from their country, which is extremely effective in closing sales. This is a very simple idea, but it certainly produces results.
Russ R. Yochum, Main & Market Sts., Bethlehem. Pa. (June, 1938)

INSECT TROUBLE

Recently I had a midget receiver (Sparton) completely infested with cockroaches that were causing the trouble. To remedy this epidemic I used "Eng Lighter Fluid" to rid coils and then blew out and powdered "20 Mule Team Borax" in the cabinet of the set. Was there recently to see how it was working, and, believe me, no insects of any kind were around that set! (Oct. 1938)

POWER TRANSFORMER PROTECTOR

On sets having power-transformer failures, I always install a miniature socket with a 6.3-volt dial light of either the 0.15- or 0.25-ampere rating (depending on the total current drain from the rectifier) in series with the center-tap lead from the high voltage winding, so as to burn out when a condenser breaks down. This stunt has never failed yet on numerous sets and is a sure guard against transformer burn-out. (Oct. 1938)
//

METAL PARTICLES IN SPEAKER FIELDS

This is generally one of the most exasperating problems, due to the fact that the particles are almost always magnetic (iron or steel) and will cling to the field poles. These particles get in in various ways and are too often due to the serviceman himself, for example, when the output transformer is being replaced and the rivets are drilled out. The result of these chips or filings is noise and terrible distortion. They must be removed. The easiest way is to apply AC direct to the field, which destroys the residual magnetism and allows the metal particles to be blown out or wiped out with a magnetized steel shim. Use 110 volts AC for the regular household set speaker and 10 or 20 volts for automobile receivers. (Dec. 1938)

TUNING CONDENSERS

In radios using dial belts or cable for drive, make sure the variable condenser is free to move before replacing the belt. Most condensers have a tension--adjusting screw in the rear. Loosen the lock nut and let the screw out just enough to free the condenser. Put in a drop of Nujol between the condenser shaft and bearing, then adjust setscrew and tighten lock nut, making sure the plates of condensers are equally spaced. Then, as a finale, check the padders for peak. On some dial belts, by simply turning the belt over so the outside of the belt is on the inside, slipping will be cured. (Dec. 1938)

SOLDERING IRON HOLDER

Secure one of the old-style 5Z4s, the one with the ventilated cage surrounding the elements. Simply remove the octal base and rectifier elements. Line the inside with asbestos and that's all there is. (Dec. 1938)

ANCIENT VINTAGE CROSLEYS

A great many Crosley (metal-box) receivers of ancient vintage show up when the independent serviceman does a little trading. It is difficult to dispose of these sets now. It will be found profitable to dismantle then and salvage the screws, nuts and other standard parts. In dismantling the set, do not overlook the two insulators extending through the variable or gang capacitors (stationary portion). These insulators make excellent non-metallic screwdrivers for alignment work. Tools of this sort are usually quite expensive, although very necessary. By

dismantling old sets many items such as this may be discovered. (June 1939) [So *that's* where all those old metal-box Crosleys went! *Quell Domage!* -- CHRS ed.]

USE FOR OLD TUBES

We have solved one of the most serious problems of our business. To dispose of our old tubes we place them in a box and save them for target practice. They make a fine "pop" when hit. We're now going to see what can be done about old razor blades. (June 1939) [The really old low vacuum in the Audions no doubt made a particularly satifying report! CHRS ed.]

HANDY TOOL

The handiest tool in my radio kit is a piece of spring steel ten inches long, 1/16 of an inch wide, and five thousandths (0.005")
thick. One end is tapered to a razor edge and is used in cleaning the plates of tuning condensers. Another use of this tool is cleaning voice-coil channels. This is done by holding it against the magnet of an old RCA magnetic speaker, thereby collecting all metal shavings from a dead speaker. (June 1939)

TUBE TESTER SELLS TUBES

We have printed in large letters on the outside of our tube tester case "WEAK TUBES MAY CAUSE DAMAGE TO YOUR RADIO." Upon entering a customer's home, we try to set the tester where it is sure to attract attention. The customer usually asks for an explanation and we really give one. We mention the danger of a tube shorting and burning out a power transformer. A comparison of the replacement costs of a set of tubes versus a power transformer is a very effective selling point. This, plus the normal tone and performance improvements to be experienced with new tubes, will nine times out of ten create a sale. (June 1939)

BEN GIVES IT

When I finish a job, I give the customer's radio a polishing. Then I present the owner with a small sample bottle of RCA Furniture Polish. The bottle has a small label on which my name, address, and other information serve as a reminder of my business to the customer. A small polishing cloth with the same message on it is also a good souvenir of my call. A repeat job is usually the result. (June 1939)

HYPODERMIC NEEDLE FOR NOISY CONTROLS

The next time you get a noise volume control, try this easy remedy. Mix carbon tetrachloride [in 1994, trichloroethylene!-- and don't breathe it!] and Lubriplate in equal parts. Place the mixture in an ordinary hypodermic needle, and inject into any available aperture on the control. The small space where the shaft enters the control is sufficient to permit entrance of the needle. You can use the same method for push-button controls, band switches, ant similar parts that are tucked away in inaccessible places. (March--April 1947)

SIMPLE METHOD TO PREVENT THE BLOWING OF TUBES

When a portable receiver is serviced, make certain after disconnecting the line cord that several seconds are allowed to elapse before it is plugged back into the line. The delay is important because unless the condensers are fully discharged, there is a possibility that the tubes in the receiver may be damaged. (March-April 1947) [Something may have gotten garbled in the original "tip": the most important reason for letting the capacitors discharge is to protect tubes when one is being plugged into the set - otherwise the whole string of fragile 1T4s, 1S5, etc. may be hit with a big overvoltage from a capacitor that has charged to an unusually high voltage. LAS, AWA ed.]

SMALL SPINTITE WRENCHES MADE FROM ALLEN SCREWS

The standard sets of Spintite wrenches do not include units to fit very small nuts. Here is a simple way of rounding out your Spintite kit. Purchase a complete set of Allen setscrews. These should be as long as possible. Grind down the threads and force--fit the threadless shank into a 7-inch piece of brass or copper tubing. Make certain, when grinding, not to remove too much metal or it may break off below the head during use. The result is a complete set of Spintites to take care of almost any small-size nut. (Aug.-Sept. 1947)
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REPAIR/RESTORATION HINTS FROM *SYLVANIA NEWS*, PART II

Not copyrighted. Some of these are included more for "old-time funk" than restoration. . .

SPEAKER REPAIR

Experience has shown that the most satisfactory solution to the problem of a defective speaker is to replace it. This holds true for the majority of speaker ailments. Many defects can, however, be satisfactorily and permanently repaired. Several cases have been encountered where the wire-braid which links the voice-coil winding to the terminal strip, has been broken at the point of entry to the cone. The braid is bent sharply so that it will lie flush with the cone. Vibration does the rest. The first step in repair is to loosen the voice-coil lead from the cone with cement thinner. The remaining tab of wire-braid is next carefully unsoldered from the voice-coil lead. The wire-braid leading from the terminal strip should now be inserted so that it extends through the cone about 1/4 inch. (The braid is usually long enough to do this without replacing it.) The voice-coil lead is wrapped around the protruding wire-braid next, and then soldered. The voice-coil lead, joint, and braid are secured to the cone with radio cement. A little radio cement applied to the underside of the cone at the point where the braid enters the cone will prevent this problem with the other lead. (Nov.-Dec. 1957)

SCREW ALIGNMENT POINTER

Adjustment of trimmers and controls of TV sets can result in quite a bit of extra work if the trouble is found elsewhere and it is necessary to return the adjustments to their original positions. It is easy to lose track of where they were before, especially in the case of recessed adjustments. To simplify this, I use common bobby pins and solder the open end by wrapping around some fine tinned wire and soldering. This makes a pointer with good tension that can be slipped on the shaft of an alignment tool and moved up or down the shaft for best position. During trimmer alignment I insert the tuning tool into the adjustment screw and then move the pin down the shaft of the alignment tool close to the chassis, marking the chassis to coincide with the end of the pin as a reference point. By observing the movement of the pointer it is easy to see whether the adjustment is 1/4 turn, etc., and right or left. (March 1956)

COVER SWITCHES ON BATTERY PORTABLES

The switches which open and close the "A" and "B" circuits of personal-type portables are usually operated by opening and closing the cover. Many times the switch is not pushed down far enough to cut off the circuit, thereby running down the battery. I add a bead of solder to the exposed part of the switch on sets which have this trouble. The longer lever will insure that the switch opens every time. (March 1956)

REPAIRING PHONO DRIVE WHEELS

For emergency repairs on working phono drive wheels which do not have any holes or dents in the rubber rim, but are worn sufficiently to slightly change the speed of the turntable, or if worn where insufficient drive pressure is maintained, the following tip may be worth while. We have found some of them going strong a year after this "temporary" repair is made. Carefully peel the rubber from the rim of the wheel and cut a narrow piece of white physician's tape just long enough to reach around the periphery in the slot without overlap, and with the sticky side toward the wheel. Then replace the rubber ring in its original position on the wheel, smoothing it down carefully and evenly. This will increase the diameter very slightly and also the pressure against the driven turntable. This stunt can be used in recorders and other units using the same type of drive. (Feb. 1953)

CRACKED PLASTIC CABINETS

Cracks on radio or television receivers may be easily and neatly repaired by following the steps listed. First, apply carbon tetrachloride (today, trichloroethylene! -- ventilated!) along the crack on the inside of the cabinet, to remove any grease or other substance. Second, apply radio cement the full length of the crack and about 1/2 inch on either side of the crack. Third, place one-inch gauze bandage over the crack, press smoothly and apply a little more cement on top of the bandage. While drying, a weight should be applied to keep the crackclosed tightly. This will do a neat, clean and permanent job. (March 1952)

REMOVING STUDS FROM PLASTIC CABINETS

I have found that the studs holding the backs on plastic cabinets (Emersons, for example) get stuck due to standing and cannot be removed easily. These

SPEAKER-CONE REPAIR

To patch holes in speaker cones, I cut a piece from any old cone. You can select from your old cone a section that has the proper contour. (June-July 1947)

SUBSTITUTING 6.3-VOLT FOR 2.5-VOLT TUBES

In modernizing old sets, I have found that hard-to--get 2.5 volt tubes can be replaced by 6.3-volt types in some sets without the expense of installing a new power transformer. The basic change necessary is replacement of the 80 rectifier with a 6X5GT. The five-volt winding is connected to the center tap of the 2.5-volt winding to get 6.25 volts. (Feb. 1947)

REPAIRING SCRATCHED CABINETS

I discovered the following method of scratch repairing by experiment and it really works: On heavily varnished cabinets where the scratch is only through the varnish, I take some No. 1 sandpaper and, holding the scratched surface horizontal, sand lightly all around the scratch, being careful to save the dust and pile it around the scratch. Put a little acetone on your finger, just enough to saturate the filings, and rub quickly over the area. Repeat this after it has dried using #00 sandpaper, after which finish with furniture polish. When carefully done the scratch will not show. (Feb. 1947)

CONVENIENT SHELF FOR POWER SUPPLY

In many cases the cable connecting the radio chassis under repair is too short to allow a convenient arrangement on the bench for servicing. I found that a small shelf, adjustable for height, under the bench makes a very handy place to put the power pack while working on the radio. It can also be used for speakers. A hole in the bench for the cord will permit placing the radio in any position for service. (Feb. 1947)

REPAIR FOR WARPED SPEAKER CONES

Many speakers of the "non-adjustable" cone type are warped enough to rattle. Ordinarily the cone or speaker would have to be replaced; however, we have found a method of correcting this in nine out of ten cases. All you do is to put four speaker shims in the center, evenly spaced, then wet the outside edge of the speaker with water. We use a camel's hair brush and wet it enough so the outside part (where the ripple is) is evenly soaked. Allow the speaker to dry thoroughly before removing the speaker shims. You will find that this will recenter the cone and save many replacements. (Jan. 1947)

ALIGNMENT SUGGESTION

Any radio can be "hopped up" considerably by placing the antenna wire or loop near a fluorescent tube and setting the gang to a non-station spot near 600 kHz. Turn the volume well up and adjust the IF trimmers and LF padder for maximum noise. Shift the gang to a non-station spot near 1400 kHz and trim the RF trimmers, only, for maximum noise. It is necessary that the IF and oscillator frequencies be approximately correct before employing the above stunt. (Oct. 1946)

LOCATING NOISY CONDENSERS

On several occasions, I have found arcing condensers to be the cause of rumble sounds and bad tone quality in radios. The procedure is: disconnect one side of the voice coil on the speaker and substitute a 10-ohm resistor, then turn the radio on. Turn the volume up and listen for arcing sounds. Other arcing parts may be detected by this method. (Oct. 1946)

TUBE SUBSTITUTION

For emergency repair, a 5T4, 5W4 or 5Y3 can be substituted for an 80 by the following method. Cut off all pins on the substitute tube except pins 2, 4, 6, and 8. Cut off all four pins on the defective 80, taking care not to damage them. Slip the two large pins from the 80 over pins 2 and 8, and the small ones over pins 4 and 6. After carefully aligning with the octal pins, solder securely, taking care that they extend about 3/8" beyond the octal key. If carefully done, the tube will fit nicely in the old socket. (Oct. 1946)

ZENITH 10S669

Owner replaced all tubes - set whistles over the entire dial, but no reception. If a metal 6K7 is being used, do not check the set for open bypass or filter capacitors. Look at the 6K7 socket -- no connection has been provided for pin no. 1, leaving the tube unshielded. Loop a stiff wire on No. 1 prong and solder the other end to the chassis. (Oct. 1946) [1994 comment: this is classic wisdom for all Zeniths in cases where a glass 6K7 is to be replaced with a metal type. AWA ed.]

will release quickly if a hot soldering iron is held against them for a few seconds. (Oct. 1951)

AID IN STRINGING DIAL CABLE

Most of the difficulty in stringing dial cable is caused by its slipping off the first pulleys while it is being put on the later ones. This can be prevented by taping it to each pulley with cellophane tape. For those cases where it has to be pulled through in order to locate the pointer, etc., a cardboard strip on top of the cord, held in place with the tape, will allow the cable to slip enough for the required adjustment. (June-July 1951)

CORRECTING WEAK CONVERTER OSCILLATION IN 3-WAY PORTABLES

Before replacing batteries and tubes in these sets, I have found it is a good idea to reduce the screen voltage of the converter tube, ordinarily a 1A7GT. Lowering this voltage has in many cases made it possible to obtain satisfactory reception with the line voltage as low as 80 volts. This is easier on the tubes than raising the filament voltage and will not cause trouble when the line voltage goes above normal. (March 1951)

SUBSTITUTING A PM SPEAKER FOR AN ELECTRO-DYNAMIC

When a customer is anxious to have his set back quickly and you do not have the necessary filter choke to do a good job, you can keep him satisfied by fastening the field coil and pole piece in some out-of-the-way spot as a temporary measure. It may make it more convenient to mount the coil and pole piece if you remove the cone and cone bracket. Most of us have an assortment of PM speakers on hand, so that there should be little delay in making the necessary repairs. (Feb. 1950)

AID IN STRINGING DIAL CORDS

Here is an idea that I use to great advantage in stringing dial cords. I take a 10-cent plastic crochet hook to reach into close places and handle the cord, tying the knots, etc. The same plastic tool can be used as an alignment screwdriver by dressing down the blunt end with a file. (Nov. 1948)
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NOISE AND DISTORTION CAUSED BY TUNING-EYE TUBE

Many servicemen are inclined to pay little attention to tuning-eye tubes when servicing radios, for the reason that they contribute nothing to the operation except as a tuning aid. I have found that they can contribute a lot of hard-to-locate trouble such as noise and distortion. If the elements in the tube are loose it can cause noise, or if the tube is gassy it can cause poor operation of the AVC system with distortion and fading. (Nov. 1948)

AID IN SOLDERING

You will find this to be a big help when soldering to terminals having a large number of wires. Insert the end of a small rat-tail file or a nail into the hole in the lug while heating up the joint, so as to make room for the new lead. The solder should not stick to the nail, or steel with ordinary fluxes. This will overcome the usual trouble of having two leads slip out while you get a new one in. (Oct. 1948)

SPECIAL WRENCH FOR DRIVE-SHAFT SETSCREWS

Some sets, especially Philcos, use a special screw on the dial-cord drive wheel for which no wrench is available, and in many cases they are so placed that they cannot be reached by pliers. A special wrench for these can be made by sawing a 1/4" deep slot in the end of a 1/4" steel rod. Use a hacksaw with two blades and widen the resulting slot to about 1/8" to fit the end of the setscrew. A hole in the other end for a T-handle or a nut brazed on to fit a socket wrench will complete this useful tool. (June July 1948)

SEALING ALIGNMENT SCREWS

Many of the "little things" a serviceman does in repairing a radio do not show. For example, few people understand about aligning a set. To them it seems to be another superficial item to increase the serviceman's profit. I have a practice of putting a little fingernail polish on the trimmer screws after they are set. For IF cans and screws below the chassis that are adjusted from the top, I put scotch tape over the holes and put the nail polish around the edge of it. This practice seems to impress customers that I have made a sincere effort to do a thorough job. I also find that people are less likely to tamper with sets fixed this way and the set remains aligned longer and better. (March 1948)

NEW ELECTROLYTIC CONDENSERS MAY PRESENT A SERVICE PROBLEM

We believe servicemen will be interested in the following, as it may affect their servicing of the newer sets as well as in the replacement of older filter condensers by units of more modern design. During the war, advances were made in the manufacture of electrolytic condensers which permit larger capacitance to be obtained in the same-size can. In some cases, this may permit a set manufacturer to use a resistance-capacitance filter or a receives to have lower hum output than the corresponding prewar set. There is a possibility of damaging the rectifier tube if too large a condenser is used without compensating changes to prevent overload. The tube, being the part which shows the effect of an overload first, is quite likely to be blamed unjustly in case of failure. Many servicemen keep a few "weak" rectifiers handy on the bench to use when checking sets suspected of filter trouble, or to reform newly installed filter condensers. This is good practice, particularly with new condensers, because the quality rating of an electrolytic condenser is given in terms of "milliamperes leakage current per microfarad." After standing idle for some time this momentary large leakage, plus the usual high charging current may be higher than the rectifier can supply. The way design engineers overcome this is by the addition of a small series resistance in the lead to the plate, 15 ohms being a probable value. Manufacturing tolerances on condensers are quite wide, so that a 10-mFd unit may even be as high as 24 mFd. Servicemen should observe the following precautions to avoid early rectifier failure.

1. Don't remove or short out a small series resistance in the
rectifier late circuit to get a little higher volume.
2. When using a larger-than-original filter condenser, add resistance in series with the plate.
3. Reform replacement condensers or use "weak" tubes as mentioned above. (May-June 1946)

SHORTS IN IF COILS

When shorted IF coils are indicated in sets using shielded units,set the receiver upright and jar slightly to dislodge any small shake-proof washers and pieces of solder which might have found their way into the shield cans and onto the trimmers, shorting them. If shaking does not remove the trouble, remove the shield can before unsoldering the leads from the coil and examine to see if the trouble is a trimmer short. It is surprising the number of cases of "shorted" IFs which can be cleared up this way. (Feb. 1946)

ALIGNING RECEIVERS WITH BUILT-IN LOOPS

In cases where you have trouble aligning these receivers, particularly at the upper end of the dial, reception may be improved by shorting or connecting a fixed condenser (0.002 or 0.02 mFd) across the antenna and ground terminals provided for use with external antennas. Certain makes of receiver provide for this with a shorting bar. (June 1945)

TO FIND A BREAK IN A MICROPHONE CABLE

A simple way of finding which end of a microphone cable has a break in it is by measuring the capacitance from the shield to the inner wire. The end having the lesser, or "no," capacitance, will be the end where the break is. ((June 1945)

TUBE REPAIR

I have found that is it possible to weld the filaments of tubes such as the 12-, 35-, and 50-series by the simple expedient of a Ford spark coil and 6-volt storage battery. While this repair is not sure-fire, due to breaks occurring near the base of the tube where the filament is welded to the wire going to the base pins, it will be effective in half or possibly more cases. I have performed this operation on a quantity of tubes with very good results, and have had very few "kick-backs" and these only on 50L6s. Practically everyone knows how to connect a spark coil up, so there would be no need in going into that. However, after hooking it up, the two top wires on the coil should be connected directly to the filament prongs of the open tube, and the juice then turned on. If arcs are visible in the tube base, or within the tube structure, chances are that tube cannot be repaired due to the breaks being too far apart; however, if there is no arc visible, the possibility is good that the tube has been successfully welded together, which can be checked by a tube tester, ohmmeter, or insertion into the set. If a first attempt at welding a tube filament checks good, and the filament opens up again, it can be put through the process repeatedly until the weld is complete, or arcs appear, in which case the tube is "open" to stay. This is by no means to be considered practical where replacement tubes are available but, the tube situation being what it is, it will sure help to get those dead sets off the shelf. (Nov. 1944)

PHILCO 1942 AUTOMATIC RECORD CHANGER

The selenium cell used in 1941-42 Philco changers can be tested by connecting it directly to a 250-millivolt meter or a 1-milliamp meter, which is more common. Under a strong light or direct rays of the sun, a good cell will go close to full scale on a 250 millivolt meter. (April 1944)

FIELD COIL BURNOUTS

I spent much time on a Crosley Model 58 trying to increase the volume to normal, but nothing seemed to help much. Finally, anotherdynamic speaker was plugged in in place of the regular speaker, and the volume appeared to increase. Checking the regular speaker, I found that at some time the field coil had apparently burned out, and instead of repairing or replacing it, the connections from the speaker to the plug had been rearranged so that the 45 output tube received its positive voltage through the output transformer primary, but no current flowed through the field coil to energize the speaker. A quick and entirely satisfactory repair was made on the field coil, by checking it with an ohmmeter to discover where the circuit was broken, which in this case was very near the core end of the winding. Then, by scraping the enamel insulation from a few turns of the winding along the outside of the coil near the core, and tapping it, the entire winding from the tap to the outside of the coil was OK, and when the connections were returned to normal, the radio performed normally, with very good volume and tone. The few turns at the inner end of the coil that were bypassed in this way have no effect, and the change in resistance is not noticeable. To check the coil for the break, I connected the ohmmeter to one end of the winding, and, using a sharp prod, scraped through insulation along the side of the winding until a point was reached where the indication changed. Repairs could also be made near the center of the coil, simply by shunting the break along the edge of the coil, after which the coil is retaped. (April 1944)

REPLACING THE BH RECTIFIER TUBE

The BH rectifier tube in some of the old-timer radios can be replaced by changing the socket and using the 0Z4 or 0Z4G. The voltage and current conditions will nearly always be within the limits of the 0Z4; however, these operating conditions should be checked to make sure that there will not be an overload on the tube. The large pins are the plates on the BH and No. 2 is the cathode. (Oct. 1942)

WAR TIME EMERGENCY REPAIR OF OPEN ELECTRO-DYNAMIC SPEAKER FIELD COILS

Field coils which are open and for which replacements cannot be secured due to national-defense restrictions, can in most cases be repaired by simply connecting an auto spark coil across the open field coil, leaving it on until the field shorts closed. This sparking burns across the open break inside the coil so the wire closes again. The heat from the spark is so intense it tends to fuse the wire together and forms a fairly permanent war-time repair. This is also effective for the repair of open power transformers and power chokes. (March-April 1942)

SOLDERING LEADS TO CRYSTAL CARTRIDGES

Crystals used in phonograph pickups and recorder heads are permanently damaged if subjected to temperatures above 130°F, even for a very short interval of time. This makes it essential to use extreme care when soldering leads to crystal cartridges, so they are not overheated and ruined. The following precautions must be observed to a good soldering job.

1. Use a hot iron. If the iron is not hot enough, it will be necessary to hold it against the soldering lug for a relatively long time before the solder will flow. This long contact will permit heat to flow to the crystal, raising its temperature beyond the safe limit.

2. Be sure the connecting wires are thoroughly clean. If the wires are old or dirty, the solder won't take immediately. Continued heating and application of solder may easily ruin the crystal. It is always a good idea to clean and tin the wire first so you will be sure the solder will take properly.

3. Be sure your soldering iron tip is clean. A heavily corroded soldering iron won't melt and flow solder properly.

4. Work quickly. If the iron is hot and clean, and the terminal wire properly tinned, all you need for a good job of soldering is a quick touch of iron and solder to the connection. Take the iron away just as soon as you see the solder flow.

5. Never solder a lead to the case of the crystal cartridge to serve as a ground. This will invariably raise the cartridge temperature above the safe limit. (Nov.- Dec. 1940)

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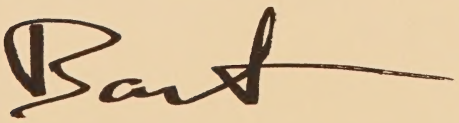

BARTHOLOMEW LEE
ATTORNEY AT LAW

(415) 788-4072

327 FILBERT STEPS
94133 SAN FRANCISCO.

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